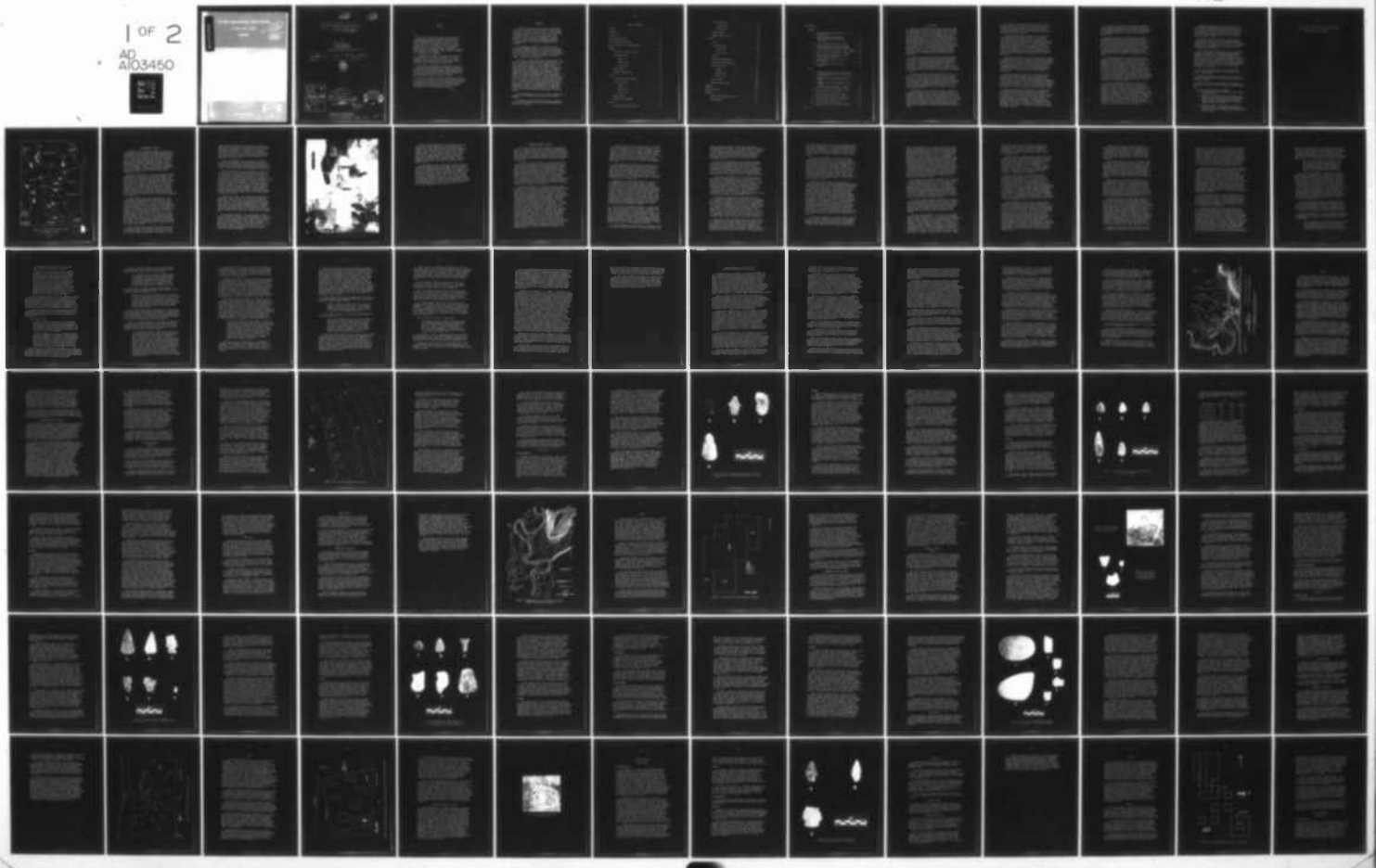
AD-A103 450 KANSAS STATE HISTORICAL SOCIETY TOPEKA ARCHEOLOGY DEPT F/G 5/6
THE 1980 ARCHEOLOGICAL INVESTIGATIONS AT THE BIG HILL LAKE, KAN--ETC(U)
JAN 80 D D ROWLISON
DACW56-78-C-0151
UNCLASSIFIED NL



THE 1978 ARCHEOLOGICAL INVESTIGATIONS AT BIG HILL LAKE, KANSAS

LEVEL II

(12)

(6) THE 1978 ARCHEOLOGICAL INVESTIGATIONS AT THE BIG HILL LAKE, KANSAS.

by

(10) Don D. Rowlison
Archeology Department
Kansas State Historical Society, Topeka

(9) Rept. for 5 Jun - 31 Aug 1978,

Submitted to:
The Department of the Army
Corps of Engineers
(15) Tulsa District
Contract Number DACW56-78-C-0151

(11) Jan [redacted] 80

(12) 130

4/12 509

ABSTRACT

From June 5 to August 31 of 1978, four prehistoric archeological sites were intensively investigated by the Kansas State Historical Society for the U.S. Army Corps of Engineers, Tulsa District. These sites were within a portion of the Big Hill lake project now under construction. The site of Big Hill lake lies within a regionally distinct geographic area of northwestern Labette county in southeastern Kansas. Big Hill creek is a major tributary of the Verdigris river, which is a portion of the Arkansas river drainage.

Archeological work within the Big Hill lake area has been conducted over a period of 12 years. The initial inventory survey for the project was achieved in 1966, followed by the excavation of four Cuesta phase houses in 1973, and testing 18 prehistoric sites in 1976.

Archeological and historical information obtained from the project study area indicate an occupation of several millennia within the Big Hill basin. Archeological evidence indicates that prehistoric aboriginal groups inhabited the vicinity as early as 3,600 B.C. with the largest number of known sites representing Early Ceramic groups.

The work in 1978 was conducted to salvage cultural data from sites in the vicinity of the dam which would be destroyed by construction activities. The most recent work completed the investigation of those areas and provided additional data concerning the settlement pattern and the archeological significance of sites in southeastern Kansas.

FOREWORD

In March of 1978 contract negotiations began between the Kansas State Historical Society and the United States Army Corps of Engineers, Tulsa District, for archeological investigations at four prehistoric sites in Big Hill lake, southeastern Kansas. All of the archeological sites considered in this contract have undergone a cultural evaluation in 1976 and were recommended for additional and more intensive archeological investigations prior to being subjected to the impacts of construction and inundation.

The contract was awarded May 23, 1978 and State Archeologist, Thomas A. Witty, Jr. served as the Principal Investigator. The field work of this project phase began June 6 and lasted until August 31, 1978. The writer directed the actual field work to partially complete the guidelines stated in the Scope of Services submitted by the Army Corps of Engineers, Tulsa District.

This project could not have been completed without the support of many individuals and various organizations. The Corps of Engineers, Tulsa District, personnel of List and Clark Construction, plus Mr. and Mrs. Robert Hanley of Cherryvale are all thanked for their support, patience and cooperation during this phase of the project. A special thanks must go to a hardworking crew consisting of field foreman Jack Fisher, and laborers Brian O'Neill, Steve Schmidt, Rick Crowder, Mike Eggleston, Paul Robbins, David Bibb, Kivel Yankey, and Ernie Carr. Special recognition must also be given to the staff of the Kansas State Historical Society for their constant support and particularly to Tom Witty, who supervised and criticized the activities of the project; to Donna Frost, who was responsible for channeling communication throughout the summer; to Bruce Jones, who provided moral support and entertainment; to Belinda Neal, who patiently typed the manuscript; and to the editors of the Society staff who diligently waded through the various drafts.

Also acknowledgement goes to A. S. Tomb of Kansas State University for his specialized assistance in the pollen analyses.

All specimens, maps, photographs and records resulting from the project are housed in the Archeology Department of the Society at Topeka.

TABLE OF CONTENTS

Illustrations

Figures

Plates

INTRODUCTION

As part of the planning and preliminary studies for the projected construction of a multiple-purpose lake in the Big Hill creek basin, located in Labette county, Kansas, a series of archeological studies have been conducted over a period of several years. The initial archeological work in the Big Hill lake vicinity was a survey arranged in an agreement between the Department of the Interior, National Park Service and the Kansas State Historical Society. During a pedestrian reconnaissance in 1966, conducted by James O. Marshall a Society archeologist, nine archeological sites were discovered within the area of the dam and the limits of the multipurpose pool (Marshall 1966). Subsequent but limited survey work during the autumn of 1972 recorded five additional sites within the project area which would be subjected to impact by construction activities and/or inundation (Witty 1973: KSHS Files).

In 1973, the Society again contracted with the National Park Service to begin archeological salvage investigations "of historic habitation sites where surviving material and the potential for data will soon be destroyed" (Witty 1973: KSHS Files). Those investigations included 11 weeks of excavation at three Middle Woodland sites. Four house floors associated with Cuesta phase artifacts were exposed. Tom Witty directed this phase of the field work. This author was a member of the crew.

The third archeological study conducted at the site of Big Hill lake began in the late summer of 1976 for the Tulsa District of the U.S. Army Corps of Engineers (Rowlison 1977). The primary purpose of that study was to provide a specific cultural resource assessment to be derived from data recovered from archeological testing of previously identified prehistoric sites within the proposed Big Hill lake project area. An historic-architectural survey was not dictated in the Scope of Work design of 1976.

Additional data were needed to establish the significance of the remaining sites and to develop a research plan for mitigation of damage to those cultural resources. The cultural affiliations of many of the archeological sites tested in 1976 had not been previously identified with certainty. This testing procedure was designed to collect information concerning cultural affiliations and the spatial limitations of the sites. The testing was also designed to provide supportive and analytical data for evaluations and recommendations concerning other project phases.

The cultural evidence utilized in the report of the 1976 work was recovered from a total of 18 archeological sites, 13 of which had been recommended for additional study in the original survey records. The additional five sites were recognized to contain pertinent and complementary data during subsequent survey investigations.

Preliminary comparisons of artifacts from the Big Hill area with those from the nearby Elk City lake vicinity, investigated during the 1960s, indicate a similarity of a body of cultural traits which have been identified as criteria of the Cuesta phase (Marshall 1972). The Cuesta phase settlement pattern revealed in the Elk City area indicated the presence of nucleated or primary villages of some size and complexity (Marshall 1972). The 1973 field work in the Big Hill vicinity suggests an alternate settlement pattern is present in this area which is composed of "extended villages" of smaller size and possibly less complexity (Witty 1973: KSHS Files).

Field research methods employed in 1976 included collection of exposed surface material, coring with a hand-operated Oakfield soil sampling tool, controlled hand dug excavations, mechanized removal of soil overburden at selected sites, plus the mapping and photographing of each site. That season's work also included the systematic collecting of soil samples from the archeological sites to provide another form of analysis for interpretations of cultural features and identifications of soil strata.

The investigations of 1978 were also conducted under an agreement with the Kansas State Historical Society and the Tulsa District of the U.S. Army Corps of Engineers. The actual field work began in June to undertake mitigative measures at four prehistoric sites which would be threatened or destroyed by construction activities. Three of the sites to be investigated had been tested during the 1976 field season whereas the other site had been recently recorded and required extensive testing.

During the systematic excavation of four sites in 1978, information obtained from the archeological investigations of 1973 and 1976 was utilized as were the then present distributions of surficial cultural materials. Heavy equipment was used to remove the cultivated zone of two sites and also for the removal of large amounts of overburden from two relatively deeply buried components. Significant cultural material was recorded by the completion of appropriate forms, photography, and mapping. Soil samples were collected within the project area, above a previously dated Preceramic component, for pollen analysis.

The recovery of any additional ecological information was also considered important in this study to assist in the theoretical reconstruction of the prehistoric environment of the immediate vicinity. Both dry screen filtering and water flotation techniques were used for the recovery of that material.

The various chert types comprising the chipped stone assemblages of the Big Hill vicinity have not yet been accurately identified as to their sources and/or locations of acquisition by the aboriginal populations. Therefore, most of the chert specimens which have been recovered during the testing activities have not yet been classified by a specific geological or geographical name. The locally occurring medium textured, gray, fossiliferous chert is commonly found scattered throughout the Big Hill lake vicinity and has been categorized as "field chert" for this report.

Occurring throughout this report are certain terms which are utilized for the classification of the recovered chipped stone materials hence, a brief explanation or definition of those terms is included. The projectile point categories consist of specimens which have the general morphological characteristics, as compared to other lithic artifacts, that are traditionally accepted as spear point, dart point, or arrow point forms. Artifacts which are not in the form of projectile points, but retain flaking scars on both faces, have been classified as bifaces. Unifaces have flaking scars on one surface and often include such implements as plano-convex scrapers. The modified flake categories are comprised of those specimens which exhibit edge alterations resulting from intentional flaking.

The debitage categories consist of residual lithic material or rejectage resulting from tool manufacturing (Crabtree 1972: 58). Chips and flakes are included with the general debitage categories and are distinguished by the presence or absence of a striking platform; flakes retain evidence of a striking platform. A general breakdown of the debitage is comprised of three varieties which include primary, secondary, and tertiary or interior specimens. A primary specimen retains cortex or weathered rind over its original external surface. A secondary flake retains some cortex on a portion of its surface. Tertiary flakes or chips are specimens from the interior of a core and fail to exhibit any cortex or weathered rind (Mallouf 1976: 152-155).

Throughout the field season, the unpredictability of nature somewhat complicated excavation procedures. Due to the drought suffered by most areas of the Central Plains in the summer of 1978, the compacted soils of the Big Hill area were greatly affected by the dryness. The lack of subsurface moisture made excavation and control somewhat tedious at all of the sites.

The metric system was utilized in all measurements, including feature records. The sites excavated in this project phase were determined from the results of the previous testing of 1976. Excavation units were 2 m or 3 m squares, depending upon the spatial extent and consistency of the interpreted cultural remnants.

Excavation records of this project utilized procedures adopted by the Kansas State Historical Society from those formulated by the University of Nebraska (Champe 1948). Initial excavation units were assigned arbitrary numbers preceded by the letter X. When specific evidence was recorded, it was assigned a feature number which corresponds with the number of the original record sheet, thus feature numbers are not consecutive. All information concerning these particular sites has been filed in the office of the Archeological Department of the Society.

The Scope of Services (1978: 1-3) dictated several specific criteria to be included within this phase of the project. These include:

(1) Additional excavation at four sites (LT304, LT305, LT319, and LT326) of which all will be affected by construction or clearing activities.

(2) A laboratory analysis consisting of any procedures and disciplines necessary to prepare a complete, accurate, written report.

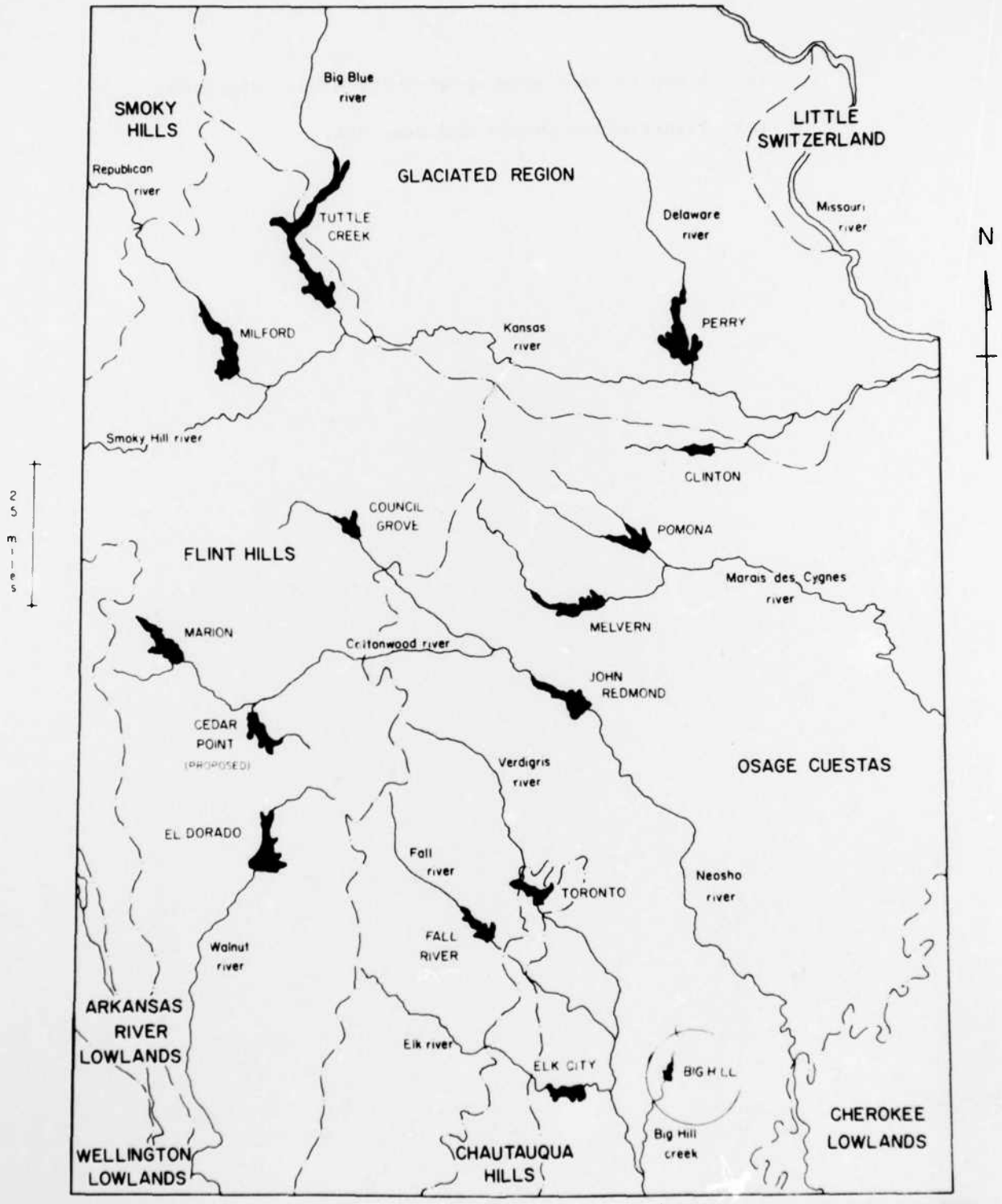
(3) A report, consisting of the following:
   (a) An abstract of the most significant data relating to the investigations.

   (b) A summary of description of the environment, the cultural history of the area, previous archeological research at the sites excavated, the research design employed in the study, and the excavation methods and techniques utilized.

   (c) The study results, including the results of the specific analyses, an interpretation and evaluation of the data, and the relationship of the findings of the research design.

(d) A map of each site showing the areas excavated.

(e) Illustrative photos and drawings.



BIG HILL LAKE AND RELATED AREAS
IN EASTERN KANSAS

FIGURE 1

ENVIRONMENTAL SETTING

Labette county, in southeastern Kansas, is situated in a physiographic area defined as the Osage Cuestas within the Osage Plains, a subdivision of the Central Lowlands province. The Osage Cuestas are bordered on the north by the Kansas river, on the east by the Ozark Plateaus and on the west by the Flint Hills Upland (Schoewe 1949: 273-280). Through geologic time, cuestas have developed locally by erosion of Pennsylvanian age strata, consisting of layers of shale, sandstone and beds of limestone, which are gently inclined to the west-northwest. Due to the inconsistent hardness of these various members, differential erosion has formed a topography of low escarpments and broad shallow vales (Schoewe 1949: 282).

Big Hill lake will lie in a small and regionally distinct geographic area known locally as the "Little Ozarks." This area consists of relatively rolling terrain comprised of steep rock strewn and wooded hills and ridges with a vertical range from hill to valley of approximately 150 feet (45.7 m). The average high elevation is 900 feet (27.3 m) above mean sea level. The area which will be inundated in the multi-purpose pool will include 1,240 acres (502 ha) or roughly a one-half mile (1 km) to five mile (8 km) section of the Big Hill creek valley. The shoreline of the multi-purpose pool level at 858 feet (261.5 m) above mean sea level, will be approximately 20 miles (32 km) (U.S. Army Corps of Engineers, E.I.S. 1973: 1-2).

Big Hill creek is said to have been named for a nineteenth century Osage leader known as Big Hill, Great Man, or l'Homme Grand (Carman 1954; f.n. 85). Big Hill creek's source is found in Neosho county, Kansas, about 13½ miles north of the damsite. From its source, it flows southwesterly for approximately 57 miles where it becomes a left hand tributary of the Verdigris river, a portion of the Arkansas river drainage. The valley through which Big Hill creek flows, is narrow, with a width of around 1,800 feet of the damsite and approximately one-half mile in the lake area (U.S. Army Corps of Engineers, E.I.S. 1973: 2-2). Stream flow ranges from zero in dry periods up to an estimated 9,000 cubic feet per second during wet periods (U.S. Army Corps of Engineers, E.I.S. 1973: 2-3). Major seasonal flooding occurs along Big Hill creek with the resulting inundation of the entire valley floor of the lake's basin.

Many of the soils in the area, both surface and buried are naturally acidic. The Cherokee silt loam is an upland soil which has been derived primarily from shale. Most of the cultivated areas are comprised of the Labette silt loam.

Other soils represented within the project area consist of Summit, Newtonia and Bates in limited amounts, with Verdigris and Osage soils primarily comprising the valley basin (U.S. Army Corps of Engineers, E.I.S. 1973:2-10). Presently, soils carried in alluvium as sediment load are relatively small due to the clay like type of soil and the lush ground cover found in much of the lake area (U.S. Army Corps of Engineers, E.I.S. 1973: 3-6).

The area of Big Hill lake may possibly be classified into three subenvironments or econiches which include the prairie, the upland woods and the bottomlands. Although there is some overlap in the flora and fauna associated with these environs, there remain various distinguishing characteristics.

The tall grass prairie is characteristic of that found in the eastern one-third of Kansas, although there seems to be a bit more of an intrusion of southern flora into the area than that which is found in the Flint Hills to the west. At one time, big and little Bluestem grasses were predominant in the project area and associated with these were the perennial prairie flowers and lesser grasses. On eroded slopes and ravines are found brush, sedges and flora such as goldenrod, milkweed, muletail, etc. At one time, the prairie supported an ecosystem that included an abundance of native fauna such as bison, deer, elk, pronghorn antelope, large carnivorous predators, many groups of small rodents, large birds of prey, prairie chickens and other numerous species of ground nesting and insectivorous birds.

Primarily, the flora of the upland woods contain several varieties of trees. Species of oak are the most commonly represented, followed by species of hickory and maple intermixed with ash, elm, hackberry, Osage orange and black walnut. Vines and shrubs are found as undergrowth and include briars, sumac, grape, Virginia creeper, blackberries, etc. Numerous varieties of song and insectivorous birds reside in these woods along with large birds of prey, numerous forms of rodents and other mammals such as coyotes, raccoons, bobcats, opossums, etc.

The bottomland forests are also represented on a small scale in the Big Hill vicinity. These bottomlands are presently used for grazing and other agricultural practices, but still maintain a local abundance of trees. Again, a large proportion of the tree types represented in these wooded areas are varieties of oak along with ash, elm, hickory, sycamore, locust, Osage orange, willow, box elder, walnut and others. This environ also supports an understory of grapes, paw paws and other fruits, berries and herbs.

PLATE 1 Aerial photo of four sites
in portions of Sections 7 and 8, T32S, R18E, Big Hill lake.

Many of the bottomland forests are adjacent to Big Hill creek and its feeder tributaries. These streams, some intermittent, provide suitable habitation for many groups of animals. Some of the fish varieties represented include gar, buffalo, sucker, catfish, bass, and sunfish, while other stream dwellers are represented by snakes, frogs, turtles, mollusks, etc. Migratory waterfowl and shore or wading birds also seasonably inhabit the area with Wood ducks and Herons being part of the resident population. Riverine mammals such as muskrat and beaver are also known along Big Hill creek.

Labette county lies in a region characterized by moderate winters and relatively long humid summers. Most precipitation occurs in the months from May to September and is usually in the form of thunderstorms of short duration and intense rainfall. Winter precipitation is longer lasting and less intense, but oftentimes is mixed with or may consist entirely of snow (U.S. Army Corps of Engineers, E.I.S. 1973: 2-2). Records covering the period from 1898 to 1942 indicate that the average annual precipitation for Labette county is 40.22 inches (Flora 1948:76). The mean temperature of the region is approximately 59°F (15°C), with record extremes from -31°F (-35°C) to 121°F (63°C) (U.S. Army Corps of Engineers, E.I.S. 1973: 2-2).

CULTURAL-HISTORICAL SETTING

Only a brief cultural-historical sketch of the Big Hill region can be made from the present literature concerning the area. The interpretations of nonliterate cultures are primarily based upon theoretical reconstructions obtained from the limited archeological data. These data suggests that the cultural time range represented in southeastern Kansas and in areas of adjacent states is quite extensive and includes occupation for several thousand years.

The earliest recognized, and most poorly represented time of human habitation in the Great Plains is termed the Paleo-Indian period, which began at least 12,000 years ago. Cultural remains have been interpreted as representing small nomadic bands of hunters and gatherers who utilized now extinct mega-fauna such as mammoth and earlier species of bison. Possible climatic fluctuations coupled with the extinction of the large mammal varieties in the plains region and other adaptation factors caused the Paleo-Indian groups to be supplanted by the later peoples of the Archaic period. Presently, manifestations of the Paleo-Indian period in southeastern Kansas and adjacent areas have been limited to occasional surface finds of expertly and distinctively made projectile points.

The second major period of cultural development, known as the Archaic, is thought to have begun as early as approximately 8,000 B.C. in some areas and extended into the early part of the Christian era in the Central Plains region. At that time, human populations expanded, though still primarily subsisting with a hunting and gathering economy. However, they were probably somewhat more dependent upon the procurement of vegetational foodstuffs than the earlier Paleo-Indian groups. Evidence of adaptation included the use of the grinding slab as is evident within the associated artifact assemblages. The fauna consisted of the modern forms of bison, deer, elk, etc. Found also were chipped and polished axes and celts and a larger variety of chipped stone implements. Although the tools manufactured by Archaic peoples were obviously quite adequate, the fine craftsmanship usually associated with implements of the preceding Paleo-Indian groups declined or is generally lacking. However, distinctive lithic specimens are present which can usually be associated with particular Archaic cultural manifestations. The Archaic period is considered to be a time of changing environmental adaptations associated with an increasing population. The sites are still small compared to those of later groups, and generally represent temporary camping or habitation areas or sometimes burial sites. Dog remains have also been identified among the remnants of the Archaic period.

Archaic sites are most often found buried in the higher, older terrace deposits. The earliest occupation which is presently recognized within the Verdigris drainage of Kansas is that of the Archaic period component at 14GR307. Hearths appearing in buried strata have yielded radiocarbon dates ranging from 1,830 ± 140 B.C. to 1,300 ± 140 B.C. Projectile points recovered from the areas near the hearths have suggested Preceramic cultural affiliations and have been identified as Afton, Ellis, Lange, and Table Rock (Calabrese 1967: 96-97).

Other Preceramic affiliations have been discovered within the southeastern region of Kansas, especially in the El Dorado reservoir vicinity in Butler county. Intensive investigations by archeologists from the University of Kansas (Grosser 1970, 1973; Bradley 1972) have revealed at least three Archaic horizons within the reservoir area. These phases have been classified from the latest to earliest as Walnut dated at 20 B.C. and El Dorado, dated at 1,700 B.C. (Grosser 1970, 1973; Bradley 1971).

Excavations by the Kansas State Historical Society in John Redmond reservoir area, Coffey county, identified and dated another site whose Archaic component, known as the Eagle Creek complex, contained projectile points similar to those found in the Lamoka phase (Ritchie 1969) as well as projectile points of the Table Rock type (Perino 1968: 96-97). Also within this site, 14CF330, human and dog burials were exposed. Radiocarbon dates of 1,550 B.C. and 1,650 B.C. were obtained from the occupation zone (Witty 1963, 1977). From the Elk City reservoir vicinity, approximately 20 miles west of Big Hill lake, a radiocarbon date of 1,730 ± 180 B.C. was obtained from a charcoal sample associated with a cultural feature which was interpreted as a deeply buried Archaic hearth (Witty 1965: 10; Marshall 1972: 99).

To the south, in northeastern Oklahoma, an Archaic site, MY-66, has yielded a date of 7,456 ± 193 B.C. (Wyckoff 1964b: 104). Along with distinctively made projectile points which in form resemble both the Agate Basin type (Perino 1968: 2-3) found throughout the Great Plains regions as well as the Nebo Hill points of Missouri (Wyckoff 1964: 105). Sites with material comparable to those found in Oklahoma have also been identified in Arkansas, Kansas, and Missouri (Baldwin 1969: 70). Other phases which follow this late Paleo-Indian early Archaic component have also been distinguished and defined.

The Afton complex has been described as a Preceramic entity of the region comprising portions of southeastern Kansas, north-

eastern Oklahoma, southwestern Missouri and northwestern Arkansas (Wood 1961: 88-90). This complex has been distinguished by diagnostic Afton projectile points (Bell 1958: 6-7). Other tools recovered within the assemblage include stone choppers, knives, cobble manos and some bone and antler implements. Bundle burials in earthen and stone mounds have also been discovered in affiliation with the Afton complex (Wood 1961: 88-90, 115).

One of the better defined and most recognized Preceramic manifestations in northeastern Oklahoma has been identified as the Grove focus (Baerreis 1951). This Archaic entity includes three sequential periods which have been primarily determined by the presence and frequency of certain continuing traits in the tool assemblages as well as by the appearance of various new traits. The time range represented by these three periods is from 7,500 B.C. to A.D. 1 (Baldwin 1969: 70).

Cultural materials related to the Grove focus have also been recovered from Preceramic sites in southwestern Missouri and portions of northwestern Arkansas (Wedel 1961: 137). The Missouri sites were primarily investigated in reservoir project areas during the 1950s and 1960s. Sites with Preceramic cultural affiliations in northwestern Arkansas often consist of cultural activity areas in caves, rock shelters and open sites near streams. Comparisons of artifact inventories of the Ozark Bluff Dwellers from this region indicate similarities of traits to the Archaic materials from the vicinity of Table Rock reservoir, Missouri (Baldwin 1969: 71).

The currently recognized Archaic manifestation came to an end beginning approximately at the inception of the Christian era, apparently as a result of the diffusion of new technologies and ideas plus the probable assimilation of social mechanisms from the eastern Woodland areas. Technological changes included such things as the adaptation and manufacture of ceramic vessels. Also included in the diffused traits, but probably dating somewhat later, was the acceptance and utilization of the bow and arrow, which have been interpreted by the presence of small, corner-notched projectile points. Along with more extensive tool assemblages, inferences of domesticated plants are included by limited finds of such cultigens as corn (Wedel 1959: 624).

The traits of this transitional period, which has generally been termed the Early Ceramic (Champe 1946), are thought to have been diffused from the eastern Hopewellian populations of the Illinois and Ohio river valleys. The westward movement and adaptation of certain traits developed into a somewhat simpler Plains Woodland variant among the indigenous hunting and gathering groups which were then occupying the region. The acceptance of

these traits may have been the catalyst which helped create more stable communities. This particular settlement pattern may also be associated with more sedentary lifeways and an increasing local population. Changes in social structures have also been reflected in archeological interpretations of these Early Ceramic sites throughout the central states region.

Woodland groups similar to those of the east are represented by early settlements in northeastern Kansas and northwestern Missouri. Cultural remains recovered from these sites are often associated with the Kansas City focus of the Hopewell phase and are primarily recognized by distinctive traits such as grit-tempered ceramics and the chambered stone mounds which are found along the Missouri river and its tributaries. These sites share such traits with both Eastern Middle Woodland groups as well as the developing Plains Woodland groups. Sherds sharing some Kansas City Hopewell characteristics have been recovered from two sites in John Redmond reservoir, 70 miles north and west of Big Hill creek.

A Woodland related culture of the post-Archaic pre-Gibson period which was manufacturing pottery and probably farming is suggested in northeastern Oklahoma (Baldwin 1970: 4). Evidence of this culture is represented in thick, grit-tempered pottery, large corner-notched projectile points, scrapers, knives and grinding stones. The Cooper site, located along the Grand river in northeastern Oklahoma, contained the above attributes along with finely chipped axes, various endscrapers, oval mullers and small polished celts (Baerreis 1938: 78). The sherds from the Cooper site are similar to those associated with the Hopewell sites of the Kansas City area (Baerreis 1953). Sites with Woodland affiliations in northeastern Oklahoma are considered to represent a southern expansion of Hopewellian traits from the northern Mississippi valley into Missouri and Kansas (Wedel 1961: 137). The relationship of Early Ceramic or Woodland sites in northeastern Oklahoma to those sites of the succeeding sequence in that same region, especially those of the Gibson aspect, has not been fully defined (Wyckoff 1964a: 3).

Of particular importance to this study, another cultural group in the lower Verdigris, Fall and Elk river drainages of Kansas appears to have been influenced by Eastern Middle Woodland culture and has been taxonomically identified as the Cuesta phase (Marshall 1972). Cuesta phase sites have

yielded distinctive Havana pottery ware and as well as sherds with later Hopewellian motifs, although both of these types probably occurred later than A.D. 500 in southeastern Kansas. Clay-tempered ceramic wares are typical of the Cuesta phase and are easily differentiated from those of the Kansas City Hopewell focus to the north and east. Sites excavated in the Elk City reservoir vicinity indicate that somewhat complex and durable nucleated villages existed there which contained randomly distributed but relatively large oval house floors. These houses were closely grouped within a village and may have been constructed of a fabric lighter than earth or sod, a condition suggested by the widely set posts and the lack of abundant burned earth seen in sites of this phase. Midden areas have also been identified indicating some duration to the occupation of the villages proper. Among the cultural debris of the middens were artifacts of bone, stone, shell and pottery as well as culturally associated burials of humans and dogs (Marshall 1972).

Excavations in the vicinity of Big Hill lake to the east of Elk City reservoir also revealed a Cuesta phase occupation. This Middle Woodland variant was found to be comprised of a different settlement pattern which included scattered or extended villages along Big Hill creek. Oval and round dwelling floors with concentrations of fired limestone and shallow trash-filled pits were encompassed by widely spaced posts which once supported the exterior walls of the structures in the villages. No burials have yet been recorded in the area of Big Hill lake which can be directly associated with the activities of Cuesta phase peoples.

The ceramic inventory associated with Middle Woodland groups in eastern Kansas includes several variants. Primarily, the vessels are medium to large in size with conoidal bases. Some of the Woodland groups decorated the pottery with tool impressions, cross-hatching, rocker stamping, cord-wrapped sticks and dentate roulette impressions confined within zoning lines mainly along the rim and upper body of the vessels.

The lithic tool assemblage of the period is also varied and many times a large number of tool forms are represented within a single component. The largest percentage of projectile points consists of specimens with triangular blades, hafting elements or stems formed by notching the lower corners of the body, leaving an expanding, straight, or contracting stem with bases of various shapes. These artifacts range in size from 70 mm to 20 mm. The smaller implements were probably utilized as arrow points. Also represented in the stone tool inventories are large to medium sized blades ranging in shape from ovate to triangular; these bifacially chipped specimens

are recognized as tools used for chopping, cutting and drilling. Polished stone(s) modified by grinding, are represented by axes, celts, ornaments and sometimes by smoking pipes. The utilization of bone and shell for tools and other implements becomes more apparent during the Woodland period.

The Curry site in Greenwood county, southeastern Kansas, is located within the upper Verdigris drainage. This site, 14GR301, contained a Woodland manifestation which occupied the area sometime between A.D. 175 and approximately A.D. 600 (Calabrese 1967: 98). Skeletal remains of 10 individuals were exposed at the site along with a variety of stone, bone and shell artifacts. The ceramic inventory consists of wares usually tempered with either crushed limestone or indurated clay with vessels having cord-roughened or smoothed surface treatment.

Following the Woodland cultures in northeastern Oklahoma are sites which have been identified with the Gibson aspect (Wyckoff 1964: 3). In Oklahoma this aspect is primarily represented by the Spiro focus although the relationship to former Woodland manifestations is not clear (Baldwin 1969: 71). The Gibson aspect villages are thought to have been horticulturally oriented and supplemented by hunting while the human population was relatively sedentary as indicated by the remnants of semi-permanent dwellings. This group is best recognized by distinctively manufactured clay-tempered pottery, small projectile points and ceremonial centers with large earthen mounds (Wyckoff 1964: 3; Baldwin 1970: 5). The time period for the Gibson aspect is represented by radiocarbon dates which range from approximately A.D. 700 to A.D. 1000 (Wyckoff 1964a: 3).

By approximately A.D. 1000, cultural changes through adaptation and diffusion brought about new lifeways and population grouping which are identified as the Middle Ceramic period. The eastern one-third of Kansas has been recognized as containing sites of the Pomona focus which are affiliated with this broad cultural period. Structures associated with the Pomona peoples are generally smaller and of lighter construction than the more formalized dwellings of other contemporaneous Plains farmer groups. Shallow basin-shaped pits are usually associated with the Pomona structures although interior hearths are usually lacking within the area encompassed by irregularly placed post holes. Structural areas in Pomona sites are most often associated with relatively large amounts of fired clay daub which supports the theory that portions of the roof and/or the peripheral walls were plastered with mud over a combination of grass and saplings (Wilmeth 1970).

Ceramic remains affiliated with the Pomona focus primarily consist of globular-shaped pottery vessels with cord-impressed exterior surfaces. The tempering agents in the Pomona wares usually consist of indurated clay and/or weathered shale particles, crushed sherds, and occasionally bone. Rim forms of the vessels are usually direct or straight but sometimes out flaring with some thickening.

The generalized lithic industry of the Middle Ceramic primarily consists of small, triangular projectile points with single or double side notches or a single, central base notch. Knife forms tend to be triangular with the diamond-shaped alternately beveled variety being found. The heavy chopping tools are usually of chipped chert with some celts showing some degree of being intentionally ground. Other tools showing modification by grinding consist of mullers, grinding slabs and grooved arrow shaft abraders.

Burial practices in the Middle Ceramic period of eastern Kansas are represented by a cemetery complex of the Pomona focus. This site is identified as the Wiley site and is in the vicinity of Melvern reservoir, Osage county. Burials of this area were made by placing the body into a shallow grave and arranging it in a flexed position; the burial pits were then capped with limestone slabs. Mortuary goods in the form of pottery vessels and bifacially flaked stone tools were recovered from the pits containing human skeletal remains (Witty 1967: 2).

The cultural as well as the taxonomic relationships of the Pomona focus with the earlier Plains Woodland groups and the apparently contemporaneous Central Plains phase is not fully understood. The characteristic ceramics, Pomona ware, appears to be stratigraphically concurrent with the Verdigris ware of the Plains Woodland. The overall vessel forms and the lithic assemblages within Pomona sites resemble other Middle Ceramic assemblages and indicate a contemporaneity with the Central Plains phase. Current interpretations by some Kansas archeologists indicate that the Pomona focus may represent the adaptation of traits, by an indigenous population, from a Plains Woodland lifestyle to that of the more modern Middle Ceramic, Plains farmer technology. Radiocarbon analysis has provided a range of dates for the Pomona focus which began as early as A.D. 1020 $\pm$ 150 to as late as A.D. 1560 $\pm$ 120 (Witty 1967: 4).

The late prehistoric period in northeastern Oklahoma is predominantly represented by cultural remnants of the

Neosho focus. The Neosho focus is considered to be contemporaneous with the Fulton aspect and was primarily based on horticulture as a means of subsistence but supplemented by hunting and gathering. The artifact inventory for Neosho focus sites usually include shell tempered ceramics, small triangular projectile points, scrapers, drills, knives and other lithic tools which have been modified by chipping and grinding. Various forms of bone tools are also associated with the Neosho focus artifact assemblage. The artifact styles of this focus are common to late prehistoric groups to the south, west, north and east (Wyckoff 1964a: 4).

The last major archeological cultural grouping has been termed the Late Ceramic or Protohistoric period. This period represents a time when cultural establishments were in existence just prior to, during and after the initial contact with the first European explorers and traders. This is the first instance in which historic information may be utilized to project the identity of prehistoric aboriginal groups. The bext example of this connection relates to the "Quivira" peoples sought by Coronado, who have been identified archeologicallly as the Great Bend aspect as well as the historic Wichita groups of central, south central and southeastern Kansas. Artifacts associated with the Great Bend aspect have been identified in the Toronto reservoir area, approximately 40 miles northwest of the Big Hill lake vicinity (Howard 1964: 336-368).

The Late Ceramic period is usually associated with the historic tribal groups of the prairies and plains such as the Kansa, Missouri, Osage, etc. This period is best marked by the deterioration in quality of such aboriginally manufactured items as chipped stone tools and ceramics, plus the introduction and adaptation of European made items into the aboriginal artifact assemblages.

Following the Spanish exploratory expeditions into Kansas from the southwest came the French traders from the east who established themselves along the Missouri river in the early eighteenth century. Although the Osage Indians had probably been in contact with Europeans since 1673 (French 1851: 62) through coureur de bois for purposes of trade and adventure, the first recorded and official visit to this tribe occurred in 1719. At this time, Claude Charles du Tisne, representing the Company of the Indies, traveled by official order from the Missouri river and through southeast Kansas on an expedition to visit and trade with Poniouassa (Barry 1972: 14), known later as the Wichita (Wedel 1959: 63). At this time du Tisne was able to obtain a few horses for his overland journey across the prairie of present southern Kansas.

While traveling westward, du Tisne noted that there were many buffalo. Throughout the 1700s, the Osage remained friendly toward the French primarily for the acquisition of trade goods. Yet they were hostile against other Indian groups such as the Pawnee, Kiowa, Apache, Comanche, Wichita, sometimes the Kansa, and the later immigrant tribes, especially the Cherokee (Mathews 1961). Du Tisne commented on the Osage by saying:

> This nation is not stationary like the Missouris, but spent the winter in hunting buffalo. They are stout and well-made, and great warriors. The chiefs are abolute in their villages... They are not civilized, but are accessible by making them a few presents (French 1851: 67).

By 1820 most of the Osage had drifted out of present Missouri into southeast Kansas. In 1825 some of the Osage had established themselves along the Neosho river in present Labette and Neosho counties (Wedel 1959: 56). That same year, the tribe ceded claimed land in Missouri, Arkansas, Indian territory and south of the Kansas river to the United States government, but reserved a part of this territory, an area 50 by 75 miles in dimension, in southeast Kansas for their home. A "buffer state" 25 miles wide was established west of the Missouri state line to act as a neutral area between the Osage on the Neosho river and the American settlers in Missouri (Abel 1904: 77), which was also known as the Cherokee Neutral Lands (Mathews 1961: 628). At this time and in succeeding years, Osage villages could be found along the Neosho from present Oswego, upstream to near present Erie, Kansas (Wedel 1959: 57).

A survey of the Osage boundaries was attempted in 1827 or 1828, but abandoned due to the reported Osage hostilities toward the surveying party led by Maj. A. L. Langham. In 1826, the northern boundary of the Osage lands was designated by surveyor Isaac McCoy and party from the northwest corner of the reserve to the Arkansas river (McCoy 1890: 301-308).

In 1832, Washington Irving visited the Osage in southeast Kansas and commented about the countryside during his excursion through what are now Neosho and Labette counties. He wrote in his journal:

> Wide, treeless prairie--trembling with heat--columns of smoke hanging lazily in various directions of horizon--kindled by Indians to drive the game to the Prairies. Encamp about 11 at clear brook (f.n., probably near present St. Paul)--party of Indians,

> squaws & children encamp by us--squaws cutting wood & dragging great branches of trees.
>
> *Thursday, Oct. 4*...we have a journey of 30 miles to make over open Prairie before we can find a camping place, there being water in the interim but no wood--pass thro the village of the White Hair (Osages)--...Passed over vast prairie--here not a tree or shrub was to be seen--a view like that of the ocean...About 3 o'clock arrived at a grove on the banks of stream & encamp--place called La Bete--wood entangled with rich underwood--grape vines--peavines, &c. Fine trees--flights of Perroquets--called La Bete, or the Beast, because the Indians saw a great & terrible animal there, the like of which they never saw before or since (McDermott 1944: 98-100).

The final encampment mentioned above was probably on Labette creek a few miles above the Neosho river (McDermott 1944: 100). Also Charles Latrobe, with Irving on the same tract, noted a similar description in his journal except for observing more "lines of forest." Latrobe also included such things as "tufts of wild indigo" or big bluestem, sage grouse, meadowlarks, deer, birds of prey, butterflies and grasshoppers (Latrobe 1835: 157).

Guiding Irving and party on this adventure was one "Pierre" (Alexo) Beatte (Ellsworth 1937: 7) who was also described by Washington Irving and was living with the Osage near what is now Oswego, Kansas.

Irving wrote of Beatte:

> ...Pierre Beatte, a half-breed of French and Osage parentage. We were assumed that he was acquainted with all parts of the country, having traversed it in all directions, both in hunting and war parties; that he would be of use both as guide and interpreter, and that he was a first rate hunter.
>
> ...He was lounging about in an old hunting frock and metasses or leggins, of deer skin, soiled and greased, and almost japanned by constant use. He was apparently about thirty-six years of age, square and strongly built. His features...sharpened up, with high Indian cheek bones...He had however, a sullen saturine expression set off by a slouched woolen hat, and elf locks that hung about his ears (Irving 1849: 28-29).

Pierre Beatte lived, traveled and periodically moved with the Osage about southeast Kansas and went with them to their reservation in present Oklahoma. George Catlin, the artist, also was acquainted with Beatte and stated that he met Beatte's parents, who were French (Catlin 1973 2:93) and lived in present Labette county.

In June of 1840 Victor Tixier, a French medical student, visited the Osage along the Neosho river in eastern Labette county (Barry 1972: 411). Tixier's journals state:

> ...I suggested...that we should go and hunt turkeys in the woods which border the Neion-Chou [Neosho]. We left early; in spite of our getting up so early, the mosquitos had awakened earlier than we, and hardly had we arrived in the woods before swarms of these awful insects began to wage war on us... A turkey flew away near me...(McDermott 1940: 139).

A short time later Tixier provided a graphic mental picture of the area of present-day Labette and Montgomery counties between the Neosho and Verdigris rivers.

> Arrived on top of the hill of tombs, I saw the prairie, a huge sea of grass spotted with islands of woods, where a series of round hills rise like waves. A hill, a plain cut by a river with wooded banks, then plains, hills, and more plains as far as the horizon...The prairies which extend to the Arkansas river have tall grass, and fine forests where creepers and horse beans grow in dense thickets (Ibid.: 158).

The year 1841 witnessed the establishment of an Osage trading post at the present site of Oswego, Labette county. This post was owned and operated by John Mathews, who married an Osage affiliated with the Big Hill band. The trading post and associated buildings were in operation for 20 years before they were fired by a force of antislavery troops after they disposed of Mathews.

A report of an Osage subagent, R. A. Calloway, in 1842 reported that the Osage were still living in large towns and not readily accepting an agricultural life (Barry 1972: 454). Tixier, when visiting the Osage in 1840, described some dwellings, at Neosho village or near the site of the town of Oswego.

> ...the primitive elegance of their houses. Neion-Chou is composed of about thirty roomy huts irregularly laid out. The smaller ones, which are less numerous, are built in the shape of a cone and their tops have a narrow opening to release the smoke. The single opening, closed by a buffalo skin or reed mat lowered during the night, looks out toward the east. The larger ones, from forty to fifty feet long, from fifteen to eighteen feet high, and about twenty feet wide, are shaped as parallelograms, on top of which is a semi-cylindrical roof with two openings, one at each end, corresponding to the location of the fires inside. These huts are entered through two doors on the southern part of the two sides, which always correspond to the east and the west (McDermott 1940: 116-117).

Construction began on what was to become the Osage Catholic Mission at present St. Paul, Neosho county, in 1847. Although neither this mission nor the earlier Presbyterian missions were located in the immediate vicinity of Big Hill reservoir, they did serve as a basis for a new and concentrated cultural impact on the region and its Osage people.

Throughout the history of the Osage there was a group known as the Big Hill band. These people moved to the Neosho-Verdigris country in southeastern Kansas sometime between 1822 and 1839. Pa 'I'n-No'Pa'She, Governor Joe, or Big Hill Joe as he was known by the white men, was the leader of a village known as Big Hill (Mathews 1961: 690, 698). This village was supposedly located a few miles northwest of the mouth of the stream now known as Big Hill creek (Barry 1972: 945). Bishop Miege, visiting his diocesans in 1852, comments on the Osage of southeast Kansas. "The villages are all built on heights within a comfortable reach of wood and water...everything perfectly clean" (Ibid.: 1110).

In the late 1850s some settlement was attempted by white squatters in Labette and Neosho counties. A county organization was attempted, but failed in the year 1859. All settlers in this area were called trespassers on the Osage lands in 1860, and in October and November of that year, federal troops were sent to remove them. Many of the crops, fences, cabins and stock were destroyed by these troops to discourage any immediate rehabitation. In all probability, the purposes of the destruction of the squatter improvements were twofold, one to remove the trespassers and the other to hopefully discourage the proslavery element in southeastern Kansas. J. E. Bryan, an early homesteader, made the following account concerning the area during that time.

> In those early times the Osages roamed all over these beautiful prairies, going west, annually, on their great buffalo hunt...Cattle were plentiful and grazed the year round, keeping fat all winter on the grasses of the bottoms. Hogs were abundant; all that was necessary was to find them in the woods and kill them. Game was abundant; such as deer, turkeys, geese, ducks, etc. Wild honey could be found in the timber on all the bottoms...The prairies in many places were full of badger holes, and the coyotes were so numerous... (Bryan 1879: Labette Clippings).

According to another early settler, A. T. Dickerman, in a newspaper article written in 1909 (Dickerman 1909: Labette Clippings). "In 1860 there was no running water in the Neosho above the mouth of Spring river." This statement reflects that periodic droughts of severe intensity were not unknown in the area.

Dickerman also indicates that between 1862 and the summer of 1865 most of the inhabitants of what was to become Labette county were "...driven out...either north or south" by actions of the opposing factions during the War between the States. In May of 1863, a group of 22 Confederate officers were sent on a mission to influence various plains tribes in forming an alliance with the Confederacy. A Big Hill band of ten did not recognize any of the soldiers as those with the Humboldt command. When an attempt was made to stop the soldiers for questioning, an Osage was killed by an officer. The dead warrior was returned to the village and a war party was immediately gathered. After a running fight, the soldiers were entrapped on a sandbar on the Verdigris, where 18 were killed, scalped and beheaded. Two others supposedly escaped (Mathews 1961: 639-642). Case (1893: 19) claims that the soldiers were first surprised in what is now Osage township in northwestern Labette county.

After the Civil War an influx of veterans and their families established themselves in southeastern Kansas, and even during the growth in population Dickerman stated:

> It was no trouble to get meat in 1865 or 66, when we needed it we went out and killed it. Deer and wild turkeys were abundant and it did not take an expert to kill them. In the summer time it was no trouble to catch all the fish we wanted (1909: 10).

The statement concerning the fauna has been supplemented by Nelson Case (1893: 62):

> In the early settlement of the county, large numbers of wild animals of various kinds were caught, and added very much to the stock of provisions of the early settlers. Deer, antelope, wild geese and turkeys, and prairie chickens, as well as other birds and animals, were found in abundance. Coyotes, badgers and other carnivorous animals were here in larger numbers than was desirable to the settlers.

After living along the Neosho river in eastern Labette county for a little more than 40 years, the Osage moved westward to the Verdigris drainage in present Montgomery county, Kansas. The removal from Labette county was due to the relinguishment of a 30 mile block of land on the eastern edge of the Osage reserve which contained the Indian agency and the associated mission and school. Along the Verdigris new villages were constructed and cornfields established. The Osage relinguished the remainder of their Kansas land in 1872 and moved south into what is presently Oklahoma (Wedel 1959: 57-58).

Labette county was established from what was once known as Dorn county, named for an Indian agent, consisting in 1867 of present Neosho and Labette counties, and settled primarily along the Neosho river and Labette, Big Hill and Pumpkin creeks. Since no sawmills had been erected, most of the homes were cabins. Household water was supplied by various streams and springs near the dwellings and contributed to "a great deal of malarial sickness" (Newton 1879).

An early settler of Labette county wrote of the country as she saw it, in 1867 (Labette Clippings: 33). "Not a tree was to be seen except on each side of the Neosho river, small wonder when the yearly prairie fires are considered."

Big Hill reservoir is located in what is known as Osage township. Thomas May and family located on the northwest quarter of Section 5, the mid-section of Big Hill lake, in the fall of 1866. May died the following year and Case (1893: 109) wrote "There being no lumber in that locality the neighbors sawed up a wagon-bed and made a coffin in which to bury him."

In 1867 many settlers moved to the area, including John Oliphant, Felix Oliphant, Frank Laberdy, John Frost, Thomas Vance and others. A log house was built by citizens of the area in that same year on Pleasant May's claim. This building was constructed on the bottom land just west of Big Hill creek on Section 5 and was utilized for religious and social gatherings. The following year a school was taught at the homestead located on the southwest quarter of Section 28.

Nelson Case wrote of commercial enterprises:

> The first store in the township was started in 1868, in the southeast quarter of Section 33, Township 31, Range 18, by Luther Weakly and Frank Laberdy. In the Fall of 1869, G. W. and W. W. Blake put in a stock of general merchandise in a building erected on the town site of Timber Hill, which they continued to deal in till 1871 (1893: 110).

That same year a church or missionary station was associated with the townsite store. This church was began by a Jesuit from the Osage mission for some "New York Indians" at Laberdy's store and was supervised by Father Ponziglione (Fitzgerald 1939: 261).

A sawmill was constructed in the southeast quarter of Section 6 in the spring of 1869. The Big Hill vicinity again met with tragedy in the fall of that same year when the sawmill engine exploded and killed two men.

In the late 1860s and early 1870s several town companies were formed to commercialize Osage township and the Big Hill creek area. Town companies were formed for Cherryville, Verbana, Kingsbury, Big Hill and Timber Hill, most of these companies were abandoned before any towns were developed. The only town that had even short lived success was Timber Hill, which incorporated in 1869 and was located on the south half of the northeast quarter and the north half of the southeast quarter of Section 34, Township 31S, Range 18E. George and William Blake opened and operated a store at Timber Hill until 1871. The town dwindled and probably died when the post office there was discontinued in 1879 (Case 1893: 110, 132, 276).

Sometime in the spring of 1871, a family of four known as the Benders settled in the vicinity at the head of the Big Hill drainage. Throughout the next two years there were repeated stories concerning missing persons in this area of southeastern Kansas and the Benders were suspected as possibly being the cause of some of the absentees. When Dr. William York from near Independence was reported missing, an investigation for clues centered around the recently abandoned Bender homestead. This investigation revealed the remains of at least eight individuals buried in the proximity of the Bender home. Most of the corpses showed indications of having been killed by a blow to the head and some retained evidence of also having a deeply lacerated throat. Another body had previously been found in Big Hill creek by a clergyman of the area. That corpse was described as "a man with his head smashed and his throat cut" (Ross 1928: 472). Deductions from the investigation were that visitors of the Bender home were seated on a bench near a table; directly behind the bench, a heavy curtain had been hung to conceal the murderer, who struck the seated "guest" in the head with a hammer. When the victim was either knocked unconscious or killed, a trap door in the floor was opened exposing a pit in which the body was temporarily placed prior to being removed to the burial area in the farmyard. Supposedly the Benders escaped capture and prosecution and the murders associated with the family remain shrouded in mystery (Ross 1928: 464-479 and Brewster 1906: 29 f.n.).

Numerous Big Hills have existed throughout the history of the area including those mentioned above and others. One Big Hill was a railroad station located along the Frisco Railroad in Mound Valley township. Another was Big Hill post office that existed from 1868 to 1871 and the extended agricultural community along Big Hill creek (Case 1893: 108-276).

Since the 1870s, the Big Hill lake area has changed with the times. Although the stream valley is still fringed with trees and the hillsides are dotted with woods most of the area is used for agricultural practices of cultivation and grazing. Many forms of

wildlife can still be found along the creek and hills including deer, coyotes, raccoons, opossums, varieties of woodpeckers and songbirds, large birds of prey, numerous forms of rodents, fish, turtles and associated fauna in the creek and feeder streams.

In early July of 1976 a devastating flood raked the valley of Big Hill creek and inundated the basin for several days. During the flood several recorded archeological sites were subjected to the sheet erosion. Following the flood, many of the fields along Big Hill creek were recultivated. The net impact of these conditions was the loss or displacement of a considerable amount of cultural material.

PREVIOUS ARCHEOLOGICAL INVESTIGATIONS

Only during the past 40 years has southeastern Kansas been investigated by trained archeologists, and this in a restricted sense. Mention of prehistoric aboriginal occupants in Labette county can be found in the January 14, 1893, issue of the *American Crank* in an article which describes several villages found along the Neosho river in the eastern portion of the county. The article indicates that both prehistoric and historic aboriginal sites were recognized in the area during the nineteenth century. Throughout the article, mention is made of village sites containing such items as storage pits, grinding slabs, nutting stones, midden deposits, surface debitage, village associated burial areas, pottery, etc., (Newton 1893: Labette Clippings, 202-207).

Near the present town of Mound Valley an aboriginal site was explored as early as 1876 by W. S. Newlon, a local physician. Evidently, the material collected from this site along Pumpkin creek, which is approximately 8 km (5 miles) southeast of the Big Hill reservoir area, showed indications of being affiliated with prehistoric peoples. The collection of artifacts obtained from this site were furnished for display in conjunction with the 1876 World's Fair in Philadelphia (O'Connell 1977).

Sometime around 1866, Dr. T. A. H. Lowe observed petroglyphs in Labette county. These carvings were on the faces of two slabs of sandstone which were set parallel, 10 to 13 feet long and from 2½ to 3½ feet wide. The top edges of the slabs formed an angle of approximately 45 degrees. On the outer faces of these stones were aboriginally carved figures and also names of European origin (Remsburg 1912: 122). The location of these specific petroglyphs is not included in the files of the Archeology Department of the Society. W. K. Moorehead's *Archeology of the Arkansas River Valley* states that a number of village sites were reported along the Neosho by W. Stout prior to 1931 (Moorehead 1931: 84).

In the late 1930s Waldo Wedel of the Smithsonian Institution visited southeastern Kansas and reported various artifacts collected in the region. On a hilltop overlooking Big Hill creek and the Verdigris valley near Liberty, Kansas, an isolated sandstone outcrop was found to bear petroglyphs. These carvings consisted of two and possibly three feather bonneted figures on horseback plus other art which included small bored holes and carved facsimilies of deer tracks (Wedel 1959: 492). Wedel also mentions boatstone specimens from Labette and Montgomery counties (Ibid.: 557).

The next reported archeological investigations were achieved by limited survey in 1951 under the auspices of the University of New Mexico. This survey primarily consisted of inquiries and

interviews with local landowners or tenants concerning site locations, and 13 new archeological sites were recorded in Montgomery county (Varner 1951: 1-6).

From 1963, to and including 1966, field survey and subsurface investigations were conducted in the Elk City reservoir area near Independence, Kansas, by the Kansas State Historical Society. These four seasons of work at a series of sites produced artifact assemblages and buried cultural features encompassing a broad time range and representing a variety of prehistoric cultures ranging from Archaic and Early and Middle Ceramic up to and including the historic Osage of the nineteenth century in the Elk City area. During the field work of the 1960s a new phase, the Cuesta, was designated. This phase falls into a Woodland and/or Early Ceramic group, according to the taxonomy of Kansas (Marshall 1972).

The valley of Elk river has been occupied by prehistoric peoples for at least five millenia. The earliest known habitation of the area, 14MY309, dates to approximately 3,500 years B.P. and was represented by a cultural zone discovered below eight meters of overburden (Witty 1965: 10). In another area, the Infinity site, 14MY305, was identified as the type site of the Cuesta phase. Material recovered from this site consisted of such artifacts as distinctive pottery sherds, large stone projectile points, chipped stone blades, polished celts and gorgets, cut deer mandibles, an incised canine tooth and grinding and milling stones. Mammal remains primarily consisted of elements of deer, beaver and raccoon. Burials associated with the Cuesta occupation and this nucleated village were those of children and dogs (Marshall 1972).

Small sites representing the Pomona focus, a Middle Ceramic occupation in eastern Kansas and the Elk City vicinity, have yielded stone artifacts and some daub intermixed with sherds from globular, cord-roughened pottery vessels.

The Pomona peoples are recognized to have lived in small, scattered communities and engaged in limited horticultural activities as well as hunting and gathering for subsistence (Marshall 1966a: 2).

Later historic groups, probably Osage, were also represented along Elk river by scattered, limited surface finds and historical documentation. To this date there have been no systematically controlled archeological investigations associated with an historic Osage site in Kansas.

The first sites in the Big Hill reservoir area were recorded in 1966 by James O. Marshall of the Kansas State Historical Society working under contract with the National Park Service. This initial

survey identified nine archeological sites that would either be threatened by construction activities or inundated by reservoir impoundment. Tentative identification of the sites from the survey information suggested that six were Early Ceramic sites and three were sites of an undetermined cultural affiliation (Marshall 1966a).

In 1972-1974, Tom Witty recorded 10 additional prehistoric sites that would eventually be included in the lake area as part of subsequent survey activities along and near Big Hill creek. In April, May and June of 1973, the Archeology Department of the Society carried out 11 weeks of archeological investigations in the reservoir area which were funded cooperatively by the National Park Service. Three archeological sites were studied and four lodge floors were carefully exposed. The outline of each house was generally defined by deeply set and widely spaced post holes. Features contained within the house walls consisted of stone filled hearths, shallow pits, and a few interior post molds. The artifact assemblage was quite similar to the material found in the Elk City reservoir, which is approximately 20 miles west of the Big Hill area, although the settlement patterns are distinctly different. This complex has been defined as an Early Ceramic group known as the Cuesta phase of the Plains Woodland.

Limited surveys of opportunity in 1973 and 1974 identified other cultural affiliations in the Big Hill basin. Some of these sites were identified as Middle Ceramic sites of the Pomona focus (Archeology Files, K.S.H.S.).

Limited surveys of secondary and primary roads in Labette county have, for the most part, shown negative results, although several archeological sites have been recorded along the various streams and secondary tributaries of the area (Archeology Files, K.S.H.S.).

Eighteen prehistoric archeological sites were investigated during 1976 testing associated with the Big Hill lake project. Sixteen of these sites were tested for in situ subsurface cultural material by hand dug excavation units; two sites were tested for cultural evidence with a hand-operated Oakfield coring tool. The results of these investigations indicated that nine sites would require additional archeological studies either through extensive testing or through controlled excavations.

The earliest culture which presently has been identified within the Big Hill lake basin is represented by the Preceramic or Archaic component at 14LT319. The component was discovered in the left bank of Big Hill creek and contained cultural remains consisting of lithic materials, animal bone fragments, a concentration of fire-reddened limestone, and a limited amount of worked chert. Radiocarbon dating of charcoal samples collected from a

buried hearth in Level C of Area 762 at 14LT319 indicated an occupation at approximately 5,550 ± 215 B.P. (Buckley 1977). The prehistoric peoples are probably best characterized as roving inhabitants who depended upon hunting and gathering wild foodstuffs as a means of subsistence.

Eight sites within the project area have been identified as containing an Early Ceramic component. These sites are more specifically identified with the local Middle Woodland manifestation designated as the Cuesta phase (Marshall 1972: 239). The isolated and multiple house sites in the Big Hill vicinity, apparently occupations of some duration, differ from the nucleated village pattern found in the Elk City reservoir approximately 20 miles to the west.

Comparisons of artifacts from the Big Hill area with those from the Elk City vicinity indicate certain shared cultural traits. Cuesta phase assemblages are represented in both locations by a predominance of large contracting stemmed projectile points of the Gary and Langtry types associated with some small corner-notched varieties similar to the Scallorn and Fresno types. Cuesta phase ceramics are identified as predominantly clay-tempered conoidal jars bearing dentate stamping, zone decorations and some embossing as well as punctates and smooth stick impressions.

Materials associated with a Middle Ceramic cultural affiliation were discovered at nine sites in the basin of Big Hill lake. These sites are distributed along the low stream terraces of Big Hill creek and may represent extended villages which, at one time, contained several structures. In all probability, the inhabitants of these sites had a subsistence based upon hunting, gathering and small scale horticulture.

Ceramic specimens recovered from various Middle Ceramic sites in the Big Hill vicinity are fragments of what appear to be small to medium sized globular jars with constricted necks and straight rims. The exteriors of these vessels are typically cord-roughened while the interior surfaces are smoothed or brushed and range in color from buff to dark grayish brown. Tempering in the sherds is clay and may contain inclusions of indurated clay or shale. Evidence of crack lacing holes or handles is lacking in the Middle Ceramic sherds from the area.

Worked stone is represented by a variety of chert types which appear to be of a nonlocal origin. Bifacially flaked and sometimes oppositely beveled blades are characteristic at this Middle Ceramic group of sites, along with plano-convex end scrapers and medium to small-sized projectile points.

Many sites in eastern Kansas possessing a Middle Ceramic cultural affiliation usually contain amounts of hardened or fired earth which retain grass or pole impressions. Fired earth or daub has not been observed in association with any recorded prehistoric sites along Big Hill creek.

Thus, the materials collected and recovered from Middle Ceramic sites in the Big Hill lake basin suggest the possibility of a Pomona focus variant, although pottery sherds from the Big Hill region share traits which are similar to some Middle Ceramic wares, but lack any distinct affinity to the Pomona focus definition. The lack of daub in the Big Hill sites is not typical of other Pomona focus habitation sites.

Presently, the Pomona focus is identified as occupying the eastern one-third of Kansas, with the Flint Hills forming a western boundary. Radiocarbon dating of cultural samples from Pomona sites places the temporal occupation between A.D. 900 and A.D. 1500 (Witty 1967: 4). The Pomona focus is considered to be "...a Late Woodland complex that occupied a spatial position between and temporally concurrent with the more sedentary horticulturists that compose Central Plains and Mississippian complexes" (Marshall 1972: 242-243).

Seven of the nine Middle Ceramic sites tested in 1976 required no additional subsurface investigations. It was determined that sites 14LT314 and 14LT31[illegible] contained additional in situ subsurface cultural materials and warranted more extensive testing and systematically controlled excavations. These two sites should provide additional data to more accurately define the Middle Ceramic or Pomona variant found in the valley of Big Hill creek.

Evidence of protohistoric inhabitants could not be discerned from the field investigations of 1976.

Historic documentation actually identified bands of semi-sedentary aboriginal groups occupying southeastern Kansas in the nineteenth century. The bands principally represented were most often those associated with the Osage tribe. No distinctively diagnostic Osage materials have yet been identified within the basin of Big Hill lake.

Archeological sites recorded in conjunction with the Big Hill lake project have been identified with prehistoric cultural affiliations. No historic Euro-American habitations or activity areas have, as yet, been identified as archeologically significant.

FIGURE 2 Topographic map of the vicinity in which sites 14LT304 and 14LT326 are located.

14LT304

The site is situated in the SE¼, SE¼, Section 7, T32S, R18E at an elevation of 247.8 m (813 ft). It lies along the crest of a broad flat terrace along the left bank of present day Big Hill creek. During the initial archeological survey, James O. Marshall (1966) recorded this as an Early Ceramic Woodland habitation site and recommended it as a "first priority in Big Hill reservoir project." (Figure 2)

In 1973 this site was first investigated by the Kansas State Historical Society (Witty 1973). At that time, the remains of two prehistoric habitation structures were systematically exposed and interpreted as once belonging to an Early Ceramic, Cuesta phase group which had shared cultural similarities with people who at one time inhabited the Elk City reservoir vicinity.

Artifacts and other cultural remains from the two house floors at 14LT304 suggested the presence of a hunting and gathering group which was adapting to incipient horticulture. The lithic assemblage from these habitation units demonstrated the usage of projectile points ranging from large contracting stemmed varieties to small, plain, triangular specimens. Also present were chipped and ground stone implements including hideworking tools and milling stones used for grinding vegetable foodstuffs. Probable cultigens were represented by charred kernels of corn and also sunflower seeds whereas specimens of wild flora included black walnut shells and plum pits.

Testing investigations during the 1976 season at 14LT304 was done to determine if additional cultural materials were present beyond the perimeters of the excavated house floors. Enough was located that additional, more extensive excavations were recommended (Rowlison 1977). Since the area of this site was scheduled to undergo radical modifications and soil displacement by construction activities, additional archeological investigations were necessary for the salvaging of any pertinent cultural data which might still be present.

A portion of the site had been plowed in the summer of 1977, but the remainder of the terrace still supported a lush growth of fescue. The plowed area was not planted or otherwise cultivated after that and a dense growth of weeds became firmly established. As specific portions of the site had already been previously investigated, it was decided to open up a large area for this third phase of the study. A road grader was used to remove the dense vegetation and the agriculturally disturbed stratum. Selectively placed test trenches had been excavated throughout the site to determine the actual depth of the cultivation zone, prior to the surface stripping.

The scraping activity worked almost parallel to the slight crest of the stream terrace. Three scraped trenches basically trended along a north-northwest, south-southeast axis with a length of approximately 60 m, a width of roughly 7.5 m. The depth of the cut was 20 cm below the present surface. The easternmost trench was along the eastern slope of the terrace toe and just west of an ephemeral slough. The second grader cut was made approximately two-thirds of the way up the eastern slope of the terrace. The third and westernmost area stripped paralleled the rolling crest of the terrace and exposed most of the peripheral limitations of the House 1 excavation of 1973.

After the completion of the scraping activities by the road grader, concentrations of cultural materials and discernible areas of soil discolorations were flagged for systematic testing. These tests basically consisted of 3 m excavation units established within two of the grader cuts (Figure 3).

INTERPRETED CULTURAL FEATURES

Burned limestone complexes have been discovered in archeological contexts throughout eastern Kansas. Many times, these burned stone clusters fail to contain a significant quantity of burned earth or charcoal, which is usually indicative of a hearth which was utilized for some duration or intensity. The burned stone concentrations sometimes suggest that rocks were heated and taken to a special activity area elsewhere or possibly the stones were removed from a hearth and discarded at a different locale. The burned limestone complexes associated with house floors usually do not contain evidence of having been burned in situ.

An area of burned earth and charcoal was exposed by the grader scraping activities in the middle trench, located along the eastward slope of the terrace. The irregularly shaped soil discoloration was designated as Feature 259. The perimeter of the feature was distinctly defined at a depth of 30 cm below the present surface and was approximately 30 cm in diameter. The feature was then vertically cross-sectioned by removing the eastern one-half of the stain in 5 cm levels. As the eastern half was excavated the lower portions of the concentration expanded to a width of approximately 60 cm. The thickness of the charcoal and burned earth concentration was 15 cm and basically had a plano-convex shape. Although particles of burned earth and charcoal were observed throughout the feature, the orange fired earth and larger pieces of charcoal were most prominent near the base of the concentration. A small amount of cultural material was recovered and consisted of small chert chips and small fragmented animal bone. Near the featured remains of the open fire, fragmented bone, a plain body sherd, a crude biface and a small chert core were recovered. Feature 259 is the first indication of an open fire or hearth in the Big Hill lake vicinity which was not associated with burned stones.

Feature 248 lay just below the plowed zone in X779. This cultural remnant consisted of a small complex of fire reddened limestone which was 85 cm in length along a north-south axis and 70 cm along an east-west axis. Few of the stones were piled or layered and ranged in size from approximately 15 cm in diameter to small pebbles. No charcoal or particles of burned earth were found in association with this feature, although 20 small, unburned chips and flakes were recovered from the area encompassing the complex.

Near the crest of the terrace, at a depth of 33 cm below the present ground surface, an irregular oval stain of dark humus-like soil, containing charcoal flecks and particles of burned earth, was exposed. The area was cored by scraping with small hand tools until the limits of the mixed soil were discerned. The resulting excavated pit had a rough basin configuration with a maximum depth of 20 cm and contained no diagnostic cultural materials. The fill of the feature was saved for water flotation. The floated contents contained no identifiable floral or faunal remains and was interpreted as being an open depression which may have been filled naturally.

Within the north half of X749, a small circular stain having a 13 cm diameter was observed. This stain was designated as Feature 283 and lay at a depth of 39 cm below the present surface. Coring of the stain resulted in a conical post mold which was intermixed with small particles of charcoal. This isolated post mold was 21 cm in length.

ARTIFACT MATERIALS

Ceramics

All of the ceramic specimens recovered consist of pieces of pottery vessels. No whole or restorable containers have yet been recovered from this site. Eight pottery sherds were recovered from the surface at 14LT304 during a survey of opportunity in 1977. These sherds probably represent not more than three different vessels.

One eroded, cord-roughened sherd collected from the surface is identified as clay-tempered. The exterior surface of the specimen is brown whereas the interior surface is dark gray. The core of the sherd blends from the exterior to interior hue and the total thickness of the piece is 8 mm.

Two plain smoothed body sherds were collected at the site. Both specimens are considered to have untempered clay paste. One sherd has a smooth brown exterior surface, a core which

blends from a light brown to grayish brown, a grayish brown interior surface, and a thickness ranging from 9 mm to 11 mm. The other plain sherd has a buff-tan exterior surface and a brown interior surface. The core of the specimen is gray with inclusions of indurated clay and/or weathered shale. The thickness of this artifact is 9 mm.

A relatively large rim sherd was also collected from the surface. This ceramic fragment exhibits a tool impressed lip; a smoothed over, cord-roughened, brown exterior surface; a gray core; and a smooth, dark gray interior surface. The rounded lip is decorated with concave tool impressions which are irregularly spaced and have been pressed to varying depths. The upper portions of the notches or depressions are from 4 mm to 5 mm in width whereas the depths vary from 2 mm to 4 mm. The tempering agents which are contained within the sherd may best be described as "trash"; inclusions of indurated clay, small particles of limestone, small amounts of fragmented bone, and finely crushed shell are present in the matrix of this specimen. The thickness of this particular specimen ranges from 5 mm to 9 mm.

Four small sherds, which were found on the surface in the vicinity of the above specimen, are quite similar and may be a portion of the same vessel. These specimens are also "trash" tempered with dark brown exterior surfaces, gray cores, and dark gray interior surfaces. The largest of these sherds retains evidence of being scraped or scoured on the interior surface while the vessel was in a moist condition. The thickness of these sherds are approximately 9 mm.

Within the agriculturally disturbed zone, along the eastern margin of the site, four small pottery fragments were recovered. These sherds are quite eroded but appear to be clay-tempered body sherds. The original surface treatment on the sherds cannot be discerned although in color the specimens range from buff to brown. In thickness the sherds are approximately 7 mm.

During the scraping activities along the eastern slope of the terrace toe, two pottery sherds were exposed. One specimen is an extremely eroded clay tempered body sherd which retains a gray and buff exterior surface and a gray core. The second specimen is a dense, clay tempered rim sherd which retains tool impressions along the lip. The exterior surface of the artifact is brown and smooth. The core blends from the brown exterior hue to the dark gray of the interior surface. The tool or stick impressions are aligned along the interior of the slightly outflaring

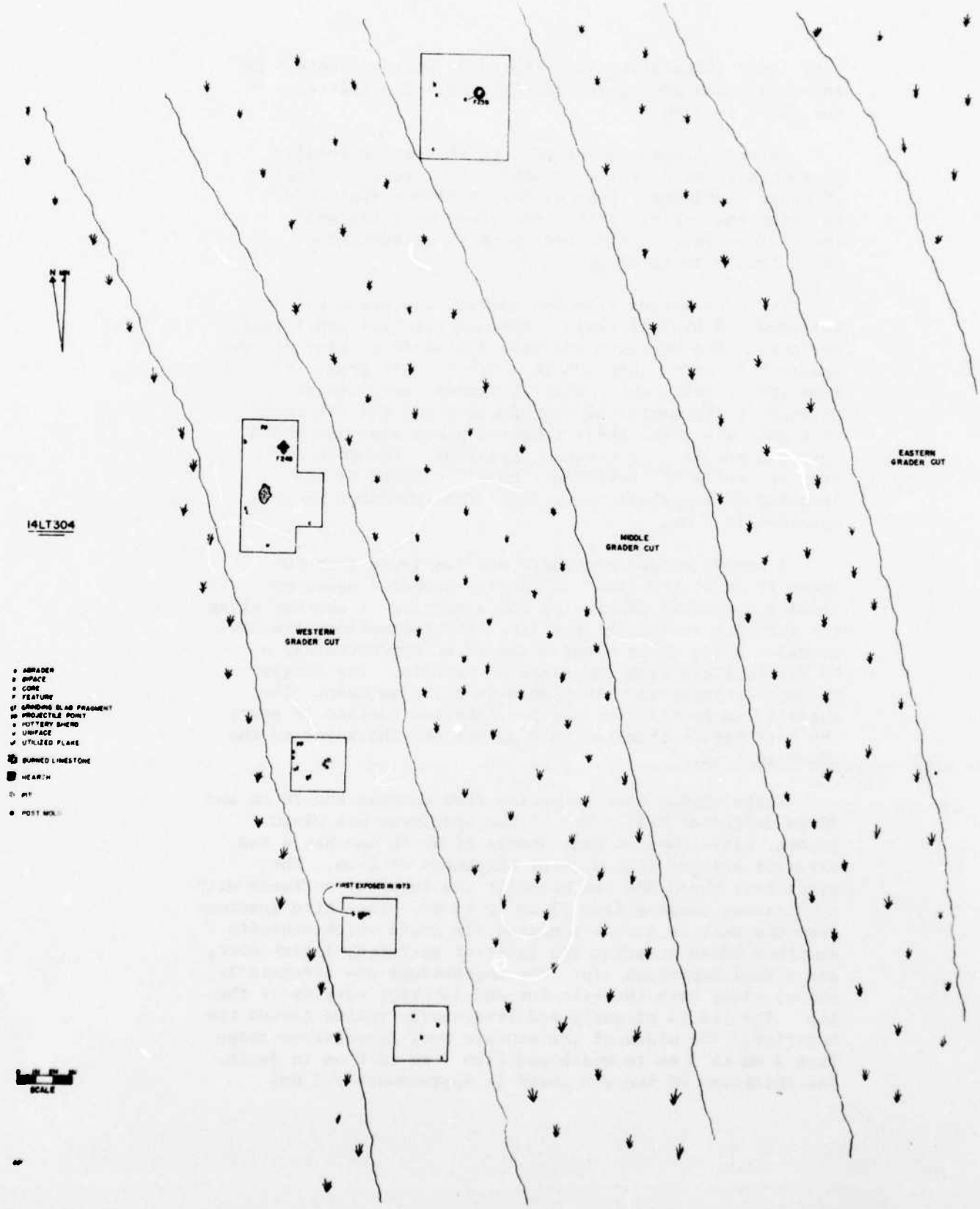


FIGURE 3 Map of the 1978 excavations at 14LT304.

lip; these indentations are spaced at approximately 5 mm intervals, and are approximately 2 mm. The thickness of the sherd is 7 mm.

Ceramic pieces retrieved from the agriculturally disturbed zone, of the main habitation area, consist of seven specimens. Four of the specimens are clay-tempered and exhibit plain, smoothed, exterior and interior surfaces. Thicknesses of these specimens range from 6 mm to 10 mm.

Two body sherds from the plowed zone are shell-tempered and exhibit plain, smoothed exterior and interior surfaces. The exterior and interior surface color of one specimen is buff, although the core is dark gray. A quantity of small white shell fragments are present throughout the matrix of the specimen and the thickness is 6 mm. The other shell tempered piece also has plain surfaces but is of a brownish gray hue. The core is gray and contains pockets or "cells" created by the leaching of the shell particles. The thickness of this specimen is 9 mm.

A small, eroded rim sherd was retrieved from the upper 20 cm of the area. This clay-tempered specimen retains a concave depression and a portion of another along the interior surface of the lip. The impressions are tool or stick marks which slant downward at approximately a 45 degree angle from the crest of the lip. The single measurable impression is 6 mm wide and 2 mm deep. The exterior surface is tan and the interior surface is gray; the core blends from tan to gray and the thickness of the sherd is 6 mm.

Three sherds were recovered from between the 20 cm and 30 cm depths of X688. Two of the specimens are plain, smooth, clay-tempered body sherds of which one has a tan exterior surface with a total thickness of 6 mm. The other body sherd has tan exterior and interior surfaces with a thickness ranging from 12 mm to 13 mm. The third specimen from the unit is a clay-tempered rim sherd which exhibits smoothed brown exterior and interior surfaces, a gray core, and a tool impressed lip. The impressions are irregularly spaced along both the exterior and interior margins of the lip. The lip is slightly and irregularly rolled toward the interior. The width of the concave tool impressions range from 2 mm to 3 mm in width and from 1 mm to 2 mm in depth. The thickness of the rim sherd is approximately 7 mm.

Two, eroded, clay-tempered sherds were recovered from below the plowed zone in X644. One specimen exhibits a smoothed, tan, exterior surface and a dense or compact grayish brown core. The other sherd retains indications of having a tan, cord-roughened exterior and a black core.

One plain body sherd was discovered below the agriculturally disturbed stratum of X762. This specimen has a tan exterior surface and a tan core. The matrix of the core includes particles of indurated clay, iron impregnated sandstone, and large grains of sand. The smooth interior surface is buff and grayish brown. The thickness ranges from 7 mm to 8 mm.

From a burned limestone complex in X779 a small, eroded, clay-tempered sherd was recovered. The tan exterior surface appears to have been smoothed. The eroded core is brown and contains inclusions of manganese and indurated clay particles.

The deepest specimen recovered during the recent investigations consists of a sherd from a depth of 42 cm in X885. This specimen is a clay-tempered body sherd which has a plain brown exterior and a smoothed, dark grayish brown interior surface. The core blends in hue from brown to gray and contains inclusions of indurated clay or shale. The thickness is 8 mm.

No restorable pottery vessels have been recovered during the archeological investigations at 14LT304. Most of the ceramic specimens are typical of the Cuesta phase wares which are currently recognized in southeastern Kansas and probably represent a single cultural component.

Chipped Stone

Projectile Points

A survey of opportunity was conducted in August of 1977 at 14LT304 during excellent collecting conditions. At that time, a portion of the site had been recently plowed and subsequent rains had further exposed cultural materials along the gentle eastern slope of the terrace. Three projectile points or point fragments were retrieved from the surface of the site during the pedestrian survey. One specimen collected is the triangular blade of a small evenly flaked projectile point made from finely textured white chert. The stem section is missing, but a portion of a notched corner is still retained. The blade section is lenticular in cross section and is 33 mm in length, 9 mm wide and 2 mm thick.

A second artifact is a bifacially flaked, plain, triangular point of the Fresno variety (Bell 1960: 44). In cross section the implement is lenticular. This specimen was manufactured from thermally altered, finely textured, fossiliferous chert. The length is 23 mm, the width is 15 mm and the thickness is 3 mm. Another specimen is a small slender, triangular projectile point which is morphologically similar to the Bonham type (Bell 1960: 10). This specimen was made from medium textured grayish white chert. The distal tip is absent as is a portion of the base. The blade is corner-notched, the sides are straight and in cross section the implement is plano-convex. The stem has straight sides and a convex base. The projected length of the artifact is 32 mm, the width is 11 mm, the thickness is 4 mm, and the stem length is 4 mm.

From just below the agriculturally disturbed zone of X644, a small bifacially flaked projectile point was recovered. The artifact has been manufactured from a finely textured white chert. This plain triangular point retains one straight side and one slightly convex side. The base is slightly concave. This specimen shares attributes with those points of the Fresno type (Bell 1960: 44) and has a length of 14 mm, a width of 10 mm, and a thickness of 3 mm.

A medium sized point, made from a very finely textured white chert, was recovered from 23 cm below the surface in X688. The artifact is comprised of a triangular blade with slightly convex edges and is deeply corner-notched, resulting in prominent barbs. The stem slightly expands and the straight base has been ground or worn. This specimen has attributes which can be associated with both the Marcos (Bell 1958: 42) and Marshall (Bell 1958: 44) forms. The length of the artifact is 43 mm, the width is 32 mm, the thickness is 5 mm and the stem length is 10 mm (Plate 2, A).

A worn, and somewhat atypical point was recovered from the depth of 29 cm below the surface in X779. This specimen has the characteristics of a resharpened bifacially flaked projectile point. The blade edges are slightly concave and exhibit prominent, protruding shoulders. The contracting stem has ground or worn edges which end at a similarly modified concave base. In cross section, the specimen is lenticular. This specimen may best be classified as a retouched Langtry form (Bell 1958: 38). The specimen is 45 mm long and 32 mm wide and 7 mm thick, and the stem length is 22 mm (Plate 2, B).

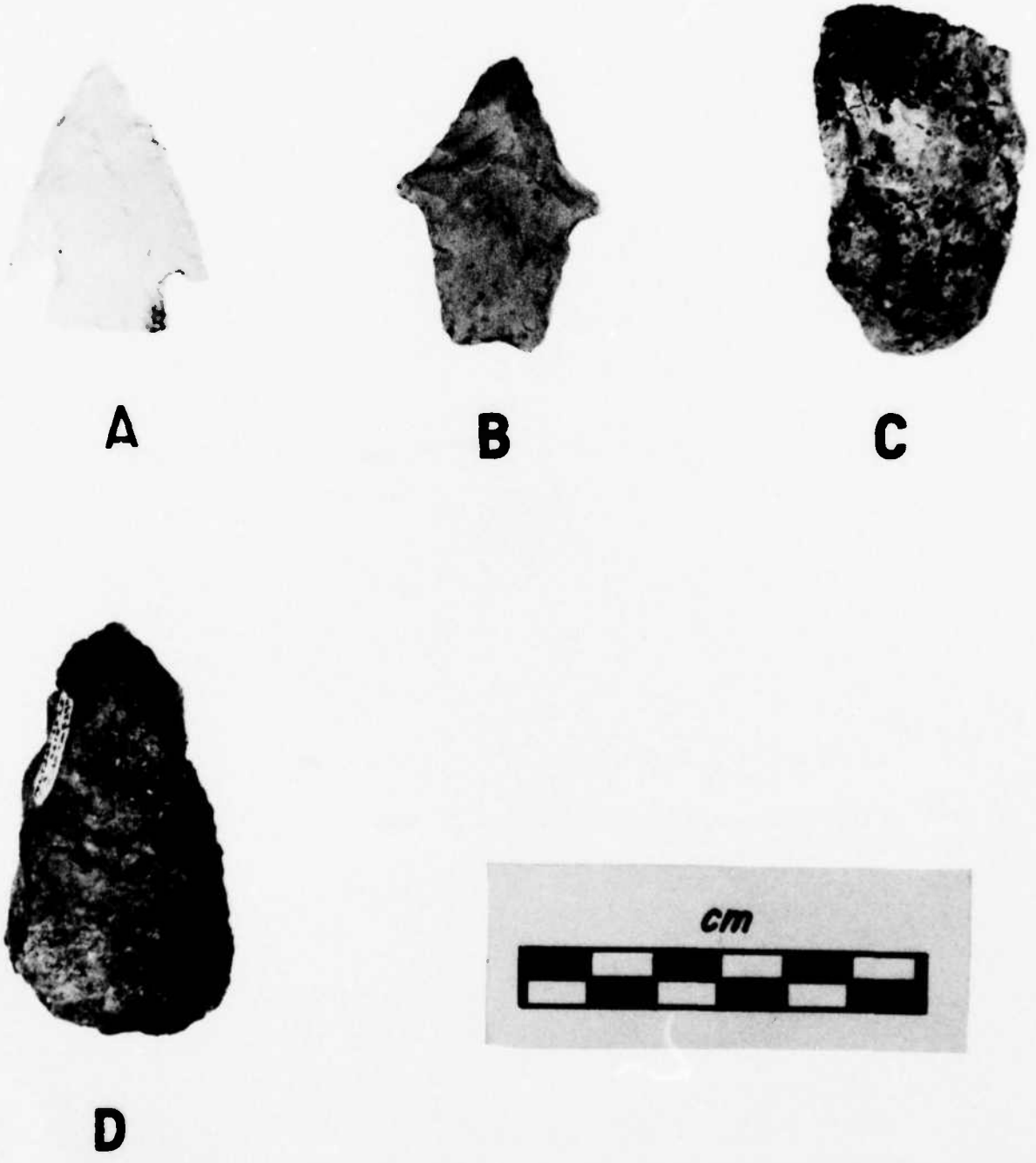


PLATE 2 Bifacially flaked stone implements from 14LT304.
A - Marcos point; B - retouched Langtry point; C - gouge;
D - knife

Bifaces

Numerous bifacially worked artifacts have been recovered at 14LT304. These specimens, in many cases, are tools which are represented by fragments which retain only enough distinguishable characteristics for a general classification.

A bifacially chipped blade section made from banded gray, thermally altered chert was collected from the surface. In cross section, the artifact is plano-convex and has steep beveling along both lateral margins of the convex face. The sides taper slightly from end to end. The maximum width is 34 mm with a thickness of 12 mm. Also in the general surface collection are five additional bifacially flaked tool fragments which have been manufactured from a variety of cherts. Four of the specimens are lenticular in cross section and one retains evidence of oppositely beveled edges. Three of the five pieces have undergone some degree of thermal alteration. Of the total, two specimens are sections with rounded ends. The thickness of these tool fragments range from 6 mm to 9 mm.

In 1978 six bifaces were collected from the surface of three specific areas which were to be graded. The easternmost strip yielded a large blade section which had been manufactured from a finely textured, thermally altered, rose gray chert. In cross section, the specimen is plano-convex with only a few flaking scars present on the plano face. One lateral edge exhibits a steeply beveled margin which also retains evidence of extensive wear or grinding and the opposing lateral margin is quite battered. The width of the artifact is 45 mm and the thickness is 11 mm.

Collected from the area to be scraped near the middle of the terrace slope were two bifacially flaked blade fragments. One specimen was made from the locally occurring chert. Intentional flaking is evident along one marginal edge of this specimen. The other bifacially flaked implement had been manufactured from a very finely textured tan chert. Modification achieved by flaking are evident along all margins of the specimen with the dorsal, or convex, face exhibiting more facial thinning than the plano or ventral surface.

From the area encompassing the crest of the terrace, three distinctive biface fragments were obtained. One bifacially flaked and worn specimen was made from finely textured white chert which contains small inclusions of iron. The lateral edges of the specimen gently taper to a point with one edge exhibiting extensive wear. This distal

fragment of a blade is lenticular in cross section with a thickness of 6 mm. Two biface fragments from the area were made of the local chert and are lenticular in cross section. One of the specimens exhibits evidence of the battering and crushing along the unbroken edges and may have been utilized as a gouge. The width of this artifact is 23 mm and a thickness of 9 mm. The other biface fragment of local chert is a blade section having a width of 27 mm and a thickness of 7 mm.

From X885 two bifacially flaked artifacts were recovered at the base of the plowed zone. Both specimens are plano-convex in cross section. One specimen was made from the local chert and retains cortex over approximately half of its surface. One face of the artifact was modified by flaking to form a gradually beveled distal end. This particular implement may best be classified as a gouge or adz with a length of 51 mm, a width of 34 mm, and a thickness of 19 mm (Plate 2, C). The other biface fragment appears to be the distal tip of a blade made from finely textured, thermally altered, pinkish tinted tan chert. This piece is 3 mm thick.

Just below the agriculturally disturbed zone of the western trench a roughly chipped biface was recovered. This artifact was manufactured from medium textured, mottled gray chert. Most of the modifications appear to have been achieved by percussion methods, except for a curved, pressure flaked, edge near one end. The curved side exhibits unifacial pressure flaking for a distance of 18 mm. In cross section, the artifact is triangular and has a length of 40 mm, a width of 29 mm and a thickness of 12 mm.

Biface sections were recovered from the 20 cm to 30 cm depths of X688, X762 and X779. All of these specimens are lenticular in cross section; one piece is the section of a tapering blade tip whereas the other two are midsections of blades. The widths of the midsections are 28 mm and 30 mm and the thicknesses are 8 mm and 9 mm.

The base of the bifacially flaked tool was recovered from the depth of 26 cm in X615. This specimen, of finely textured white chert, is the basalar portion of a blade which had a slightly expanding stem and a ground, convex base. In cross section, this proximal section is lenticular and has a width of 26 mm and a thickness of 5 mm.

Another biface was recovered from X615 from nearly the same depth as the above specimen. This roughly flaked implement has been manufactured from the locally occurring

gray chert. The faces of the specimen are basically ovate and some cortex is present on the broad end of the artifact. A portion of one lateral margin and a segment of the broader end exhibits more refined flaking than is present over the rest of the specimen. This implement may be generally classified as a cutting tool. The length of the tool is 64 mm, the width is 34 mm, and the maximum thickness is 12 mm (Plate 2, D).

A chipped stone implement was recovered from a depth of 32 cm below the present surface in X688. This specimen is a large flake of finely textured white chert which has been bifacially modified. In cross section, the artifact is roughly plano-convex with evidence of bifacial pressure flaking existing along one lateral margin. Both ends have indications of being battered. This specimen was probably utilized as a cutting implement. The length of the artifact is 46 mm, with a width of 30 mm and a thickness of 10 mm.

A finely textured specimen of possibly thermally altered, gray chert was recovered from a depth of 27 cm in X779, This artifact consists of a moderately tapering section of a bifacially flaked blade which has a lenticular cross section. The specimen retains attributes which are often associated with the distal portion of broad knife blades. The maximum width of this piece is 35 mm and the thickness is 8 mm.

Unifaces

Most of the diagnostic unifacially flaked tools and tool fragments have been collected from the surface of the site. Those specimens classified as unifaces retain distinctive unifacial modifications such as facial thinning or prominent edge beveling.

Two unifacially flaked specimens, which can be categorized as endscraper fragments, were retrieved from the surface of the site. One of the fragments is the proximal portion of a plano-convex endscraper which was manufactured from the locally abundant chert. Another fragment retains attributes characteristic of the distal portions of endscrapers and was made from a finely textured gray chert. This specimen exhibits unifacial flaking along the unbroken convex end. In cross section, one face is plano and the opposite, or dorsal, face is slightly convex. The width of this distal portion is 21 mm and the thickness is 5 mm.

Four complete or nearly complete chipped stone endscrapers were found on the surface. These specimens are all plano-

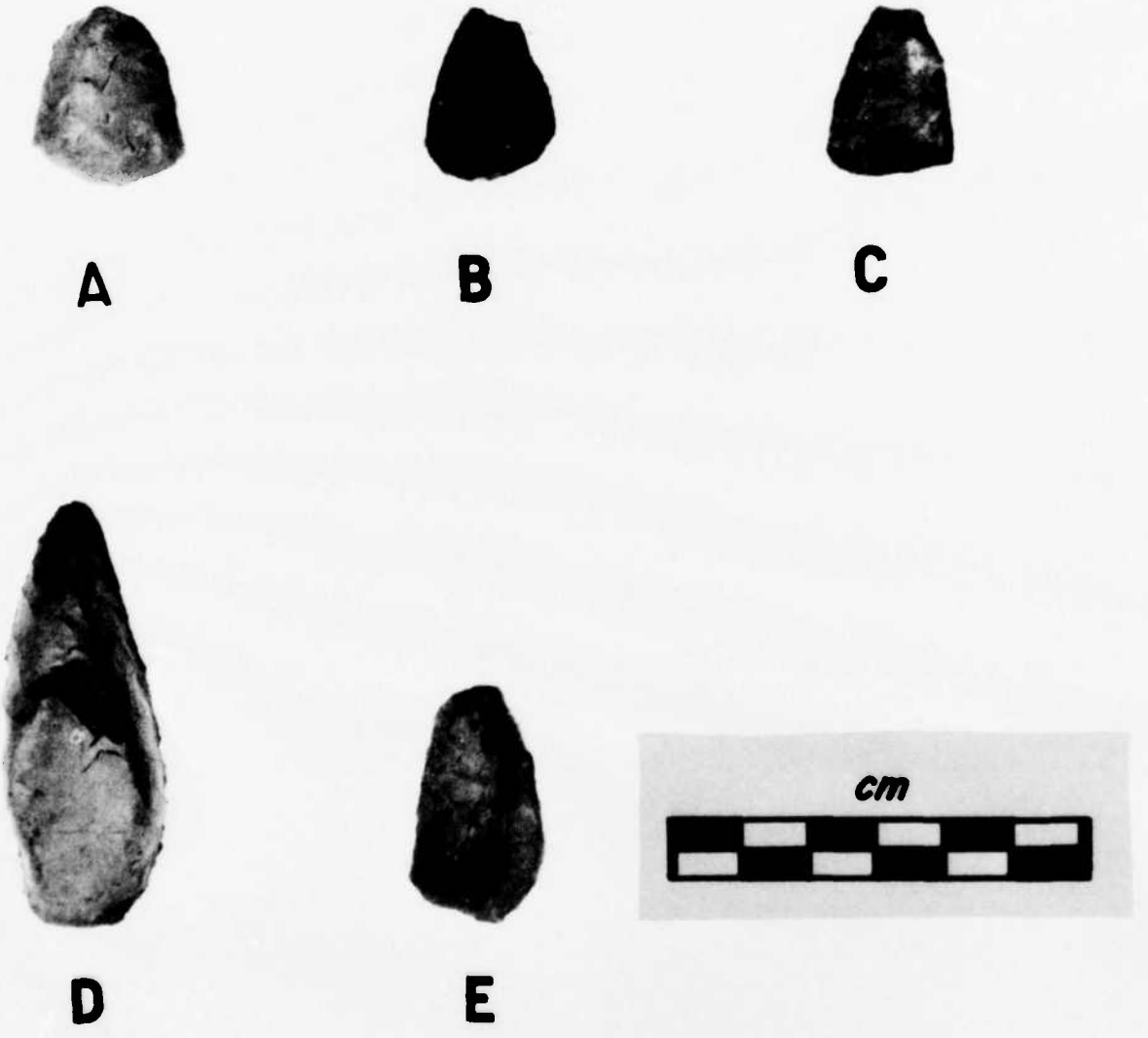


PLATE 3 Unifacially flaked stone implements from 14LT304.
A - E, endscrapers

convex in cross section with varying degrees of beveling along the lateral margins and distal ends (Plate 3; A, B, D, E). The measurements of the four implements are as follows:

TABLE I

Variety of Chert	Length	Width	Thickness
finely textured gray	64 mm	24 mm	19 mm
finely textured gray	36 mm	20 mm	7 mm
finely textured tan	26 mm	20 mm	6 mm
finely textured white	27 mm	23 mm	8 mm

Two specimens classifiable as side scrapers are contained within the general surface collection from 14LT304. One specimen is a unifacially chipped, irregularly shaped, weathered spall of finely textured white chert. In cross section the specimen is roughly triangular with a ridge separating two faces. The dimensions of the side scraper include a length of 59 mm, a width of 29 mm, and a thickness of 15 mm. The other side scraper was manufactured from a medium textured, thermally altered, pinkish tan chert. Unifacial beveling is apparent along both lateral margins although the ends have been fractured. The length of this implement could not be accurately projected, the width is 29 mm, and the thickness is 6 mm.

One specimen which is too fragmentary for functional classification was obtained during a general collection of surface material. The artifact is a portion of the tapering end of a tool which was made from a finely textured gray chert. Unifacial flaking is evident along both lateral margins of the end portion which has a thickness of 7 mm.

From below the agriculturally disturbed zone of X763, an endscraper was recovered which is plano-convex and manufactured from finely textured, fossiliferous, thermally altered, pinkish tan chert. The distal end exhibits steep beveling. The length of the scraper is 21 mm, the width is 19 mm, and the thickness is 5 mm (Plate 3, C).

Sections of three unifacially flaked blades are contained in the surface collection, all of which appear to have been thermally altered. One large blade section is of finely textured gray chert, plano-convex in cross section, and

exhibits unifacial thinning. The width of this specimen is 48 mm with a thickness of 8 mm. Another artifact is lenticular in cross section and made from banded gray chert. This blade portion is 42 mm wide and 5 mm thick. An end fragment, of what appears to have been a large blade is lenticular in cross section and comprised of pinkish gray chert. One lateral margin is straight whereas the other may be considered convex; both edges exhibit evidence of fine pressure flaking. The maximum width of the end piece is 39 mm and the thickness is 5 mm.

Core Remnants

Three core remnants were recovered from the area which included the primary habitation area of 14LT304 and the westernmost area which was stripped by the blade of the grader. Two of the pieces were collected from the surface. One of the specimens from the surface is an irregularly chipped piece of finely textured tannish-gray chert which has a length of 47 mm, a width of 31 mm, and a thickness of 25 mm. The other core remnant is of finely textured light gray chert which has been thermally altered. One face of this core remnant was reduced by relatively systematic flaking whereas the opposite face exhibits only one large flaking scar and a few smaller scars. In cross section the specimen is triangular. The length of the artifact is 52 mm, the width is 17 mm and the thickness is 26 mm.

A core remnant was discovered at a depth of 24 cm in X763. This specimen is of the locally occurring chert which retains evidence of having possibly been thermally altered prior to reduction by flaking. Some cortex is present on one surface of the object. In cross section, the artifact is triangular. The length of the core remnant is 43 mm, the width is 30 mm and the thickness is 23 mm.

Modified Flakes

Five modified chert flakes were collected from the surface of the site. All of these specimens exhibit modifications resulting from probable usage or retouching by flaking. The specific function(s) for which the flake tools were utilized cannot be accurately determined, although it is generally thought that the flakes were used in cutting or scraping activities.

The surface collection includes a large, roughly circular, secondary flake of medium textured white chert which exhibits marginal retouching along its edge. The diameter of this flake is 46 mm and the thickness is 12 mm.

Four modified flakes, which were retrieved from the surface are tertiary or interior specimens. All of these artifacts exhibit evidence of marginal flaking and/or indications of crushing or battering. One specimen appears to have been thermally altered. One of the larger flakes has a plano-convex cross section, evidence of unifacial pressure flaking along its edges, a length of 40 mm, a width of 21 mm, and a thickness of 6 mm.

From below the plowed zone of X763, a unifacially modified, thermally altered flake was recovered. The flake is of a pinkish gray hue and has been retouched along one lateral edge. The thickness of the tool is 4 mm.

A primary flake of medium textured gray chert was recovered from a depth of 27 cm in X615. This artifact has been unifacially flaked along one margin for 18 mm and battered along a lateral edge. The specimen which is plano-convex in cross section, retains some weathered rind and an area of cortex on one face. The length of the modified flake is 30 mm, the width is 26 mm, and the thickness is 9 mm.

Debitage

Unmodified lithic materials collected from the surface during the survey of opportunity in 1977 consist of 115 pieces. A finely textured white chert comprises 37% of the total collection. The white chert is represented by 20 secondary flakes and 23 tertiary specimens. The local gray chert category contains 29 pieces of which nine are secondary and eleven are tertiary. Medium to finely textured gray chert in the collection consists of two primary flakes, two secondary flakes and 18 tertiary chips and flakes. Tan and brown specimens are represented by one primary, one secondary and six tertiary pieces. Thirteen thermally altered specimens were collected of which one is a primary flake, two are secondary, and ten are tertiary.

From the randomly distributed test units which were excavated to establish the depth of the agriculturally disturbed zone, 20 pieces of debitage were recovered. A breakdown of those specimens consist of five pieces of local chert, seven of finely textured gray chert, three of white chert, and five flakes which retain indications of having been thermally altered.

During the scraping of the easternmost or downslope area along the eastern margin of 14LT304, lithic material was collected from the previously disturbed plowed zone. A total of 28 specimens were recovered from this area. Included

with the collection are 16 pieces of the locally occurring gray chert of which five are medium sized primary flakes and chips, three are secondary, and eight are tertiary. Six tertiary flakes of a medium to finely textured gray chert were recovered. A small tertiary chip of finely textured tan chert was also retrieved from the plowed zone. Five tertiary flakes have indications of thermal alteration.

From the second area scraped, located approximately two-thirds of the way up the eastward slope of the terrace toe, a total of 30 pieces of debitage were collected. This collection includes 18 specimens of the locally abundant chert of which five are primary pieces, three are secondary chips and flakes, and 11 are tertiary. Three specimens are tertiary flakes of gray chert. White chert includes two tertiary specimens. Brown or tan chert is represented by two primary flakes and one tertiary flake.

From the units excavated within the second area scraped by the road grader, 66 specimens of debitage were recovered. Thirty-three percent of the pieces are comprised of the local chert variety of which six are primary flakes and spalls, three secondary and 13 are tertiary specimens. Finely textured gray chert is represented by 17 tertiary flakes and chips. Eighteen specimens of white chert are included with the inventory which contains one large primary flake, two secondary flakes and sixteen tertiary pieces. Four tertiary chips and flakes of a very finely textured tan chert are also present. Thermally altered specimens consist of five small tertiary flakes.

The westernmost scraped area transected the primary habitation area. The agriculturally disturbed stratum of that area yielded 150 pieces of debitage of which 40% are specimens of the locally occurring chert. Thirteen primary flakes and spalls, sixteen secondary flakes, and thirty-one tertiary chips and flakes of the local chert are included with the collection. Finely textured gray chert is represented by two secondary flakes and 35 tertiary flakes. Thirty-one specimens of white chert were recovered of which one is a primary flake, twenty are secondary, and ten are tertiary or interior pieces. The smallest category is comprised of the tan or brown cherts of which one specimen is a secondary flake and nine are tertiary. Eight percent of the total inventory from the upper 20 cm of the site is comprised of thermally altered specimens. These pieces which retain evidence of having undergone various degrees of heating include one large primary flake, three secondary flakes, and eight chips and flakes of the tertiary variety.

From the excavation units within the westernmost stripped area, 232 specimens of debitage and/or rejectage were recovered. Seventy-six of the pieces are the local chert of which seven are primary flakes, and spalls, twelve are secondary, and fifty-seven are tertiary specimens. Gray chert, of which many pieces

are recognizable as Florence, is represented by 52 specimens. Five gray pieces are primary flakes whereas nine are secondary and 38 are tertiary. Fifty-four fragments of finely textured white chert are included with the inventory of which there are three each of primary and secondary specimens and 49 tertiary pieces. The tan or brown chert category is comprised of one primary flake, two secondary specimens, and 24 tertiary chips and flakes. Eleven percent of the debitage from below the agriculturally disturbed stratum exhibit indications of thermal alteration. Those pieces which have been heated include two primary specimens, four secondary pieces and 20 tertiary chips and flakes.

Ground Stone

Compared with other sites within the Big Hill basin, relatively few ground stone artifacts have been recovered at 14LT304. From the surface a broken and battered mano or handstone fragment was collected. This particular specimen has been manufactured from the locally outcropping sandstone and exhibits evidence of smoothing or grinding on both faces. A portion of one end is rounded as is a lateral edge whereas the opposite lateral margin is extremely battered. In cross section, the handstone fragment has a rounded wedge shape and a maximum thickness of 50 mm.

At the base of the plowed zone in X779, a unifacially smoothed specimen of burned sandstone was recovered. This irregularly shaped piece of local material exhibits ragged edges, has an 80 mm by 65 mm smoothed face, and is classified as a grinding slab fragment.

A grinding slab fragment was recovered from a depth of 31.5 cm below the surface in X688. The artifact is a piece of unburned, locally outcropping sandstone which contains inclusions of iron. This implement fragment is approximately 90 mm square and has a thickness of 18 mm.

From a 29 cm depth in X886, an irregularly shaped piece of burned sandstone was recovered. This specimen was found above a hearth and is classified as an abrader. This artifact has a unifacially smoothed surface which contains a "V" shaped groove across a portion of that face. The shape of the groove suggests the implement was probably utilized to grind lithic tools. Due to the irregular shape of the abrader, or abrader fragment, only the dimensions of the groove are included which consist of a depth of 1.5 mm and the maximum width of 5 mm.

FAUNAL REMAINS

Limited amounts of fragmented bones were recovered at 14LT304. Due to the chemical composition of the soils and various environmental factors, including the shallow depths of the cultural remains, bone material was in a poor state of preservation when discovered. The specimens were often so fragmented from crushing and/or deterioration that accurate identification was usually impossible.

Various bone specimens from the recent excavations have been identified as elements from bison, deer, opossum, and skunk. The bison and deer remains may suggest that those animal forms were being killed and utilized in various ways by the aboriginal population. The single element which represents a skunk consists of a femur section. Most of an opossum skeleton was recovered from a relatively small area. This find was interpreted as the remains of an animal which probably was not prepared for human consumption or was not contemporaneous with the cultural occupation.

SUMMARY AND CONCLUSIONS

The extensive excavation at 14LT304 provided additional insights concerning the settlement pattern of Early Ceramic - Cuesta phase groups within southeastern Kansas. Practically all of the habitation area of the site was investigated by archeologists before and also during its destruction by construction activities.

In 1973, two Cuesta phase house floors were exposed at the site. Additional investigations conducted in 1976 determined the existence of extrinsic cultural materials beyond the interpreted walls of the houses. The most recent archeological study indicated that 14LT304 supported only two habitation units of any permanence although widely dispersed cultural features existed throughout the general habitation area.

The existence of hearths, a rubbish-filled depression, an isolated post mold, and a scattering of artifacts and debitage indicate that human activities were performed in the vicinity of the two houses. A prominent midden deposit could not be discerned at the site although a mixture of burned earth, small sherds, and detritus was observed along the downslopes of the terrace toe which suggests the onetime presence of a sheet midden or radical site erosion.

After the systematic excavation with hand tools was abandoned at 14LT304, construction activities for the dam began. During the first phase of these activities, the

foliage was stripped from the site area by heavy equipment. At that time, archeological monitoring continued to determine if any significant cultural features remained within the general vicinity of the primary habitation area. The scraping of the large area provided an excellent opportunity to observe the relationship of specific cultural features, should they be exposed. Subsequent pedestrian surveys at 14LT304 recognized no significant cultural materials remaining at the site. The excavation for the core trench of the dam through the site area was also monitored. The trench provided an adequate opportunity to study soil sections for the detection of any buried cultural strata. None were observed.

In conclusion, 14LT304 represented a single component, Cuesta habitation site. This multiple house site differs from the "nucleated" Cuesta village site at 14MY305 which was excavated in the 1960s at Elk City reservoir (Marshall 1972). The two houses at 14LT304 were widely spaced and the general habitation area contained no present indications of an established midden mound, additional extrinsic superstructures, or burials.

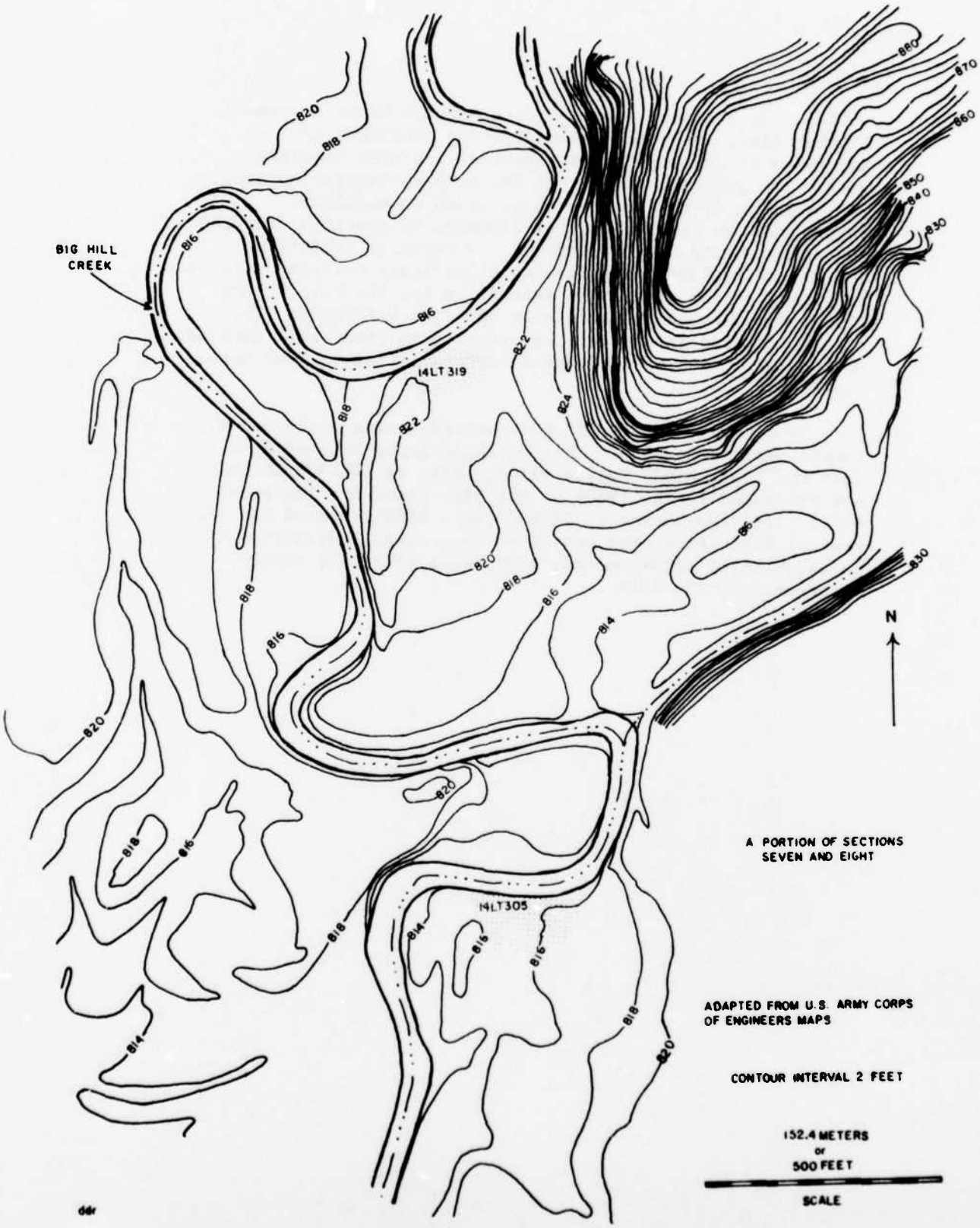


FIGURE 4 Topographic map of the vicinity in which sites 14LT305 and 14LT319 are located.

14LT305

14LT305 was situated in the NW¼, NW¼, SW¼, Sec. 8, T32S, R18E at an elevation of 249.2 m (817.5 ft) on the left or south bank of Big Hill creek, just west of an eroded hill toe. The site was first recorded in the spring of 1966 when the area of occupation supported a crop of winter wheat. At that time, a surface collection consisted of miscellaneous chert chips and a fragment of an endscraper (Marshall 1966). The area was then identified as an Early Ceramic, Woodland habitation site which retained cultural material scattered over approximately three acres. This site was again visited in June 1973 and at that time, was considered to contain no significant archeological remains and to be unfeasible for the conduction of any subsurface investigations (Figure 4).

During a reexamination at 14LT305 during the 1976 testing, a buried cultural stratum was detected in the left bank of Big Hill creek. A buried humus zone containing cultural debris was being eroded at a depth of .8 m to 1 m below the surface. Testing of the site at that time was deemed necessary since severe flooding in July of 1976 had inundated and eroded the area to such an extent that most of the previously identified upper cultural stratum had been displaced.

A systematic pedestrian survey was conducted to gain an interpretive sample of the exposed cultural materials. The density of the surficial materials indicated the need to adequately test the site. The tests indicated that cultural materials existed at a depth of approximately 30 cm and the recovered materials were similar to others classified as Early Ceramic within the vicinity.

The latest work was begun in Area 781 which was defined as lying along the western edge of an eroded terrace/hill toe, south of Big Hill creek and just west of Area 761, which had been extensively tested in 1976. A survey of opportunity in May of 1978 indicated that a relatively large amount of cultural material had been exposed by the elements within Area 781. After an abundant growth of weeds and cheat grass was cleared from this area, a grid of ten 3 m by 3 m squares was established. The initial subsurface investigations began in two adjacent rows of five squares which were oriented along a magnetic north axis.

The first eight squares excavated in this area helped determine the depth of the agriculturally disturbed stratum. The profiles of the excavations' walls indicated that the base of the cultivation zone was somewhat undulating and lay at depths ranging from 17 cm to 20 cm below the present surface.

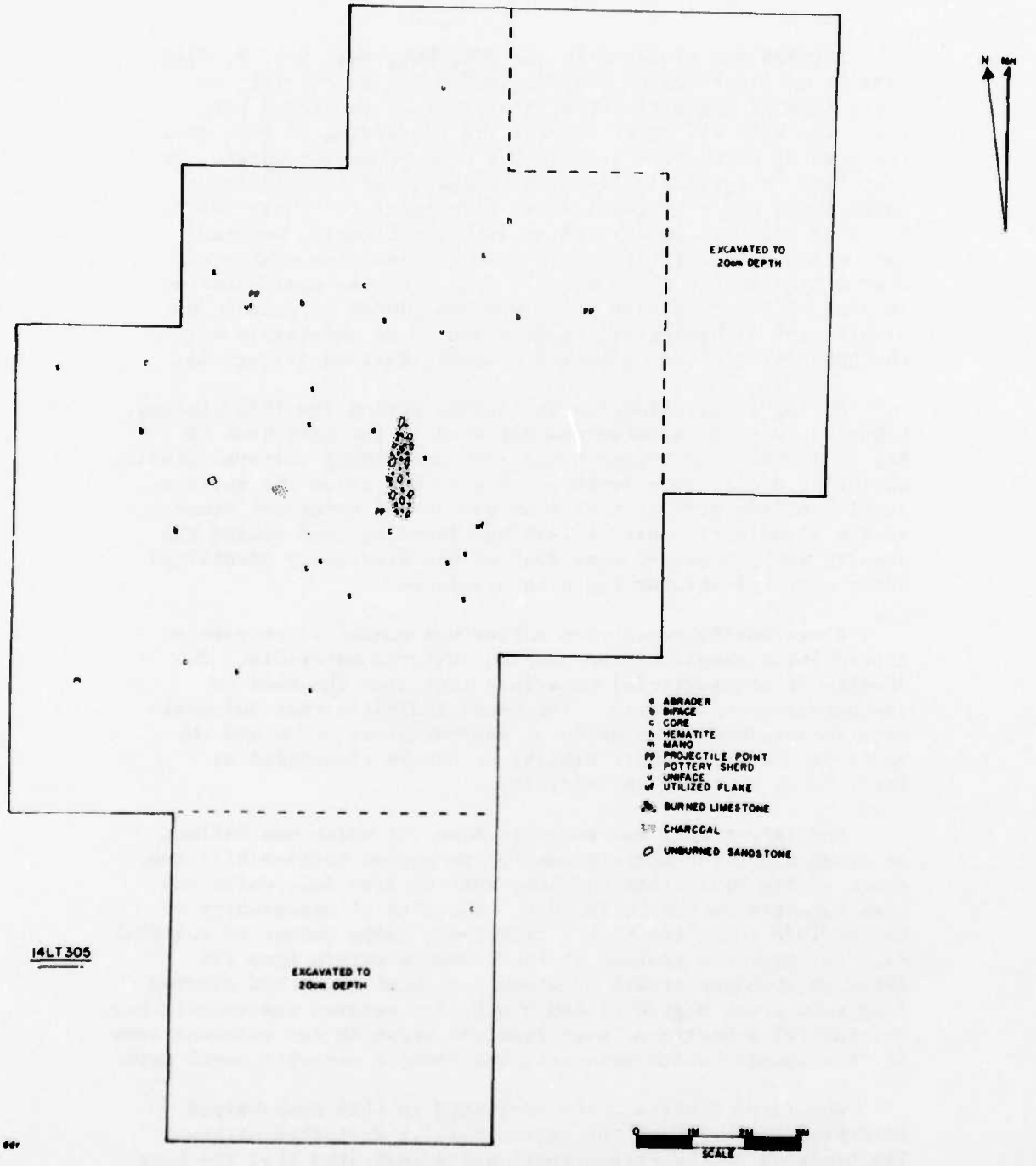


FIGURE 5 A plan view of the 1978 excavations at 14LT305.

Most of the cultural material was recovered between the depths of 25 cm and 30 cm although some cultural items were featured as shallow as a 17 cm depth and a portion of the deepest specimen lay at a depth of 33 cm. No distinct patterns of distribution could be discerned on the floor of the excavated area, which would indicate specific work or usage areas.

The lack of subsurface moisture in Area 781 made the excavation and recovery control extremely difficult. To partially combat the problem of extreme dryness, a pump was utilized to transfer water from a small stagnant pool in Big Hill creek to the area of excavation. By filling the excavation units with approximately 20 cm of water during the last hour of the work day, and allowing it to soak overnight, the floor of the excavations could then be more easily and carefully worked the following morning. By utilizing this technique any variegated soil discolorations became readily apparent and cultural features could be adequately exposed for field interpretation and photographing.

The excavated portion of Area 781 was soon expanded to the east, north and west of the initial eight excavation units. All squares were excavated within the area containing the most cultural materials, which resulted in having an essentially uninterrupted excavation area of 207 square meters or 23 contiguous 3 m X 3 m squares (Figure 5).

An additional isolated excavation unit was established on the northern periphery of Area 781 along the left or south bank of Big Hill creek. Since 1976 a concentration of burned limestone cobbles had been exposed by flooding and weathering at a depth of 75 cm below the present surface.

INTERPRETED CULTURAL FEATURES

Feature 279 was a cultural remnant consisting of a relatively small but scattered complex of fire reddened limestone which had neither burned earth or charcoal in association. It was identified at a depth of 31 cm below the present surface. The scattered stone was contained in an area 1.8 m along a north-south axis and 65 cm along an east-west axis. An artifact discovered within the complex was one small weathered pottery sherd.

Along the northern limit of X630, and partially extending in X639, a concentration of charcoal was exposed. This particular feature was on the floor of the interpreted habitation level and measured 38 cm along a northwest-southeast axis and 23 cm along a northeast-southwest axis. Although no burned earth or artifacts were found in association with the charcoal, one small piece of burned sandstone was present.

A 3 m X 3 m square was opened directly above a burned stone concentration in the stream bank which had been partially exposed by erosion and lowered 75 cm to expose the uppermost stones of the complex. The feature primarily consisted of friable cobbles of fire reddened limestone intermixed with tabular fragments of burned sandstone (Plate 4). Particles of charcoal and burned earth were also contained within the hearth as well as three small fragments of turtle carapace and one small flint chip. The excavated hearth was oval in outline and absent of any culturally diagnostic artifacts. The east-west axis of the featured complex was 2.18 m in length and the north-south axis measured 1.9 m, whereas the thickness of the limestone cluster was 25 cm. After the removal of the burned stones, the flecks of charcoal and burned earth were scraped away to expose a shallow gently sloping basin. The contents of the feature, that consisting of the earth and charcoal fill, was filtered by water screening and flotation to recover any small faunal or floral remains. The flotation results proved negative.

ARTIFACT MATERIALS

Ceramics

Ceramic fragments recovered from the intensive archeological investigations at 14LT305 consist of 62 pieces. No restorable vessels were recovered from the excavations. Most of the sherds are considered to be clay-tempered and relatively compact with small inclusions of hematite, manganese, and indurated clay or shale, all of which are found naturally in the soils of the Big Hill vicinity. Those specimens which are not classified as clay-tempered contain significant amounts of crushed shell or bone, limestone and sand.

Most of the sherds recovered from Area 781 are identified as body sherds. These fragments are primarily the plain and smoothed ware which were found in association with cord-roughened specimens and also eroded sherds which retained no indications of the vessels' surface treatment. The colors in the ceramic inventory range from buff to black. The exterior hues include buff-orange, tan, brown, and a dark grayish brown which may be the result of fire clouding. The cores range in color from buff to black and oftentimes blend from the exterior surface to the hue of the interior surface. The interior surfaces of the miscellaneous sherds range from a buff-orange hue to black. The body sherds range in thickness from 6 mm to 11 mm with a mean thickness of 8.5 mm.

Eleven pottery sherds were collected from the surface of Area 781, all are plain or smoothed wares although the tempering agents vary. Five of the sherds were essentially clay-tempered and exhibit an abundance of indurated clay particles within

the core. An atypical curved specimen, of the clay-tempered variety, suggests that a base of a globular or conoidal jar is represented. One small eroded sherd contains small limestone particles throughout the dark gray core. Five of the ceramic fragments are tempered with small particles of mollusk shells or bones within the gray cores whereas the exterior and interior surfaces of the sherds are tan or brown. One of the shell-tempered specimens curves abruptly at one edge, suggesting the possibility of once being a portion of a flat based vessel having outflaring sides. Some areas of smoothing or burnishing are exhibited on the exterior surface of the specimen.

From the agriculturally disturbed stratum of the Area 31 ceramic pieces were recovered. Of those sherds, 25 were considered to be clay-tempered, one contained small particles of limestone, three were tempered with shells and two contain a significant amount of sand.

The sherds which are classified as clay-tempered consist of both plain or smoothed specimens and also a cord-roughened ware. Some of the indurated clay particles contained within the sherds are as large as 6 mm in diameter.

The two sand-tempered sherds from the upper 20 cm both retain smoothed brown exterior and interior surfaces although both are gritty to the touch. The cores of these specimens differ, with one blending from a light to dark brown hue whereas the other core ranges from brown to gray. The matrix of the cores include both indurated clay particles and a relatively homogenous sand of angular but weathered quartzitic materials.

Three small shell-tempered specimens retain smooth, tan, exterior and interior surfaces. The cores of these body sherds are compact and gray.

Distinctive cord-roughened sherds are present in the ceramic inventory of 14LT305. The cord-roughened surfaces have probably resulted from the application of a cord-wrapped stick or paddle. Impressions left by the cordage range from 1 mm to 3 mm in width, indicating that the cordage was approximately 1 mm to 3 mm in diameter. Impressions of the cord remaining on the exterior surface of the vessels, by direct application, suggest the use of some form of fiber cordage which appears to have the characteristics of a single two-ply S-twist (Rohn 1971: 114-115). Some of the cord-roughened sherds have been smoothed after the application of the cord-roughening when the clay is still moist, almost obliterating the cord markings. The roughening on most of the sherds appears to have been applied haphazardly or multi-directional. Three of the four cord-roughened sherds retain tool or brush marks on their interior surfaces. The marks

PLATE 4 A partially excavated hearth at 14LT305, along the left bank of Big Hill creek.

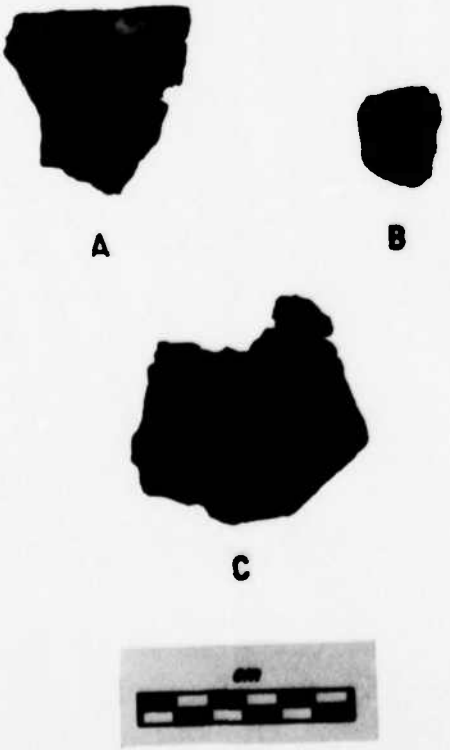


PLATE 5 Three rim sherds recovered from 14LT305.
A - cord-roughened rim;
B - plain-smoothed rim;
C - dentate-decorated rim.

have a nonuniform pattern and may have resulted from smoothing or thinning the interior surface by scraping or brushing with an unidentified coarse tool or other readily available material.

One eroded rim sherd was recovered from the upper 20 cm of the area. The specimen exhibits simple decoration along its slightly outflaring rounded lip. The decoration consists of a series of small, shallow, tool or stick impressions which are 3 mm to 4 mm at the upper widths and spaced approximately 2 mm apart. The exterior surface of the sherd was smoothed and is of a light brown hue.

The cultural stratum, which had not been disturbed by the plow yielded 20 pottery fragments. These specimens are similar to the wares previously described for 14LT305 and include five cord-roughened body sherds, nine plain or smoothed sherds, three eroded body sherds, a decorated body sherd, and two rim sherds.

Like the upper 20 cm of the area, the lower stratum contained sherds having varying tempering agents. A plain body sherd, which has smoothed buff exterior and black interior surfaces, contains an abundance of small limestone particles. some as large as 3 mm. The thickness of the sherd is 7 mm. From the depth of 30 cm, two plain sherds which contain an abundance of sand and indurated clay in their matrix were recovered. These two specimens may be portions of a single vessel with a thickness of approximately 9 mm.

The remainder of the sherd inventory from 14LT305 consists of the typical plain and cord-roughened clay-tempered material. Bone or shell inclusions could not be discerned in the ceramic fragments recovered from the 20 cm to 30 cm level.

One small, plain, clay-tempered rim sherd, was recovered from below 20 cm. The specimen retains a tan exterior surface and a gray interior surface. The lip is slightly outflaring and has a thickness of 5 mm (Plate 5, B). A large cord-roughened rim sherd was discovered just below the plowed stratum. The exterior surface is buff whereas the interior surface is tan and the middle of the compact core is gray. The lip of the sherd is rounded and exhibits cord-roughening along its crest. The neck is straight and flares slightly outward as the sherd thickens near the area of the shoulder. The thickness at the lip varies from 5 mm to 6 mm whereas the thickness near the shoulder is from 8 mm to 9 mm (Plate 5, A).

Four sherds were recovered from the 25.5 cm to the 30 cm depths of X629. These fragments suggest that a single large vessel may be represented. All specimens share similar

attributes in appearance, texture, etc. The exterior surfaces are tan and smoothed while the interior surfaces are a smoothed brownish gray. The cores of the sherds are gray and contain inclusions of indurated clay, hematite and manganese particles. The thicknesses of these specimens vary from 8 mm to 9 mm. From the disturbed stratum of this excavation unit, three similar sherds were recovered, which may have been portions of the same vessel.

Several uniquely decorated sherds were recovered from various depths in Area 781 and from four different but adjacent 3 m square excavation units. The sherds contain the natural clay matrix commonly found in the Big Hill vicinity. The undecorated exterior portions of the sherds are light brown and smoothed. The interior surfaces are smoothed and brown or brownish gray. The cores are compact and gray. The decoration was applied while the vessel was moist. The marks on the sherds are either lenticular or triangular as if a comblike or finely serrated tool was utilized to make the angular impressions. The dentate pattern is somewhat unstructured inasmuch as the essentially horizontal rows of the decoration are not evenly spaced and many times, overlap other rows. In some cases, five distinct rows of depressions can be observed whereas on the largest recovered sherd, nine rows of the marks are exhibited. The curvature of the largest sherd suggests that the decoration was probably applied around the neck of the vessel, just above what may be considered the gently sloping shoulder (Plate 5, C). Thicknesses of the sherds range from 8 mm to 11 mm.

No evidence of handles, lugs, or crack lacing holes could be discerned on any of the ceramic specimens from 14LT305.

Miscellaneous Burned Earth

Three specimens of untempered burned earth were recovered from Area 781. The pieces are basically amorphous and do not exhibit any distinguishing characteristics which would indicate whether they were formed intentionally or utilized for a specific function. The specimens are primarily tan with gray fire clouding and contain no fiber or floral impressions.

A burned insect nest was recovered from the upper 20 cm of the area. This specimen retains the characteristics of a mud dauber wasp nest. Two complete irregularly cylindrical chambers are present as well as portions of three other chambers. This object has been fired to an orange buff hue and has a surficial texture of very fine grained sandstone.

Chipped Stone

Projectile Points

Relatively few projectile points were recovered from Area 781 of 14LT305 as compared to those which have been found at

other sites within the Big Hill basin. Most of the twelve specimens from this site are fragmentary and thereby lacking many of the definitive attributes required for adequate classifications.

Three specimens which appear to be projectile point fragments were collected from the surface of Area 781. One is a bifacially flaked proximal section which has been manufactured from a medium textured brown chert. The fragment is corner-notched and retains an expanding stem with a straight base. The shoulders of the blade are prominent and appear to have once been barbed. In cross section, the specimen is lenticular and has the proportions of a medium sized dart point with a thickness of 6 mm and a stem length of 10 mm. The artifact is too incomplete for a typological classification.

The second specimen is the proximal portion of a contracting stemmed projectile point. This artifact was made from a very finely textured, thermally altered, tannish gray chert. The stem of the fragment has been bifacially flaked and the base is missing. Portions of both shoulders are present and in cross section, the blade is lenticular with a 7 mm thickness. The contracting stem of this specimen is typical for both the Gary (Bell 1958: 28) and Langtry (Bell 1958: 38) varieties. The third specimen collected from the surface is the proximal portion of a contracting stemmed point. This artifact was made from finely textured white chert. The lateral edges of the stem are worn or intentionally ground. The stem is lenticular in cross section and retains a convex base similar to those usually associated with Gary (Bell 1958: 28) projectile points. The stem thickness is 6 mm.

From the upper 20 cm of Area 781, five artifacts were recovered which are identified as portions or complete projectile points. One specimen consists of the basalar section of a probable Gary (Bell 1958: 28) point which was manufactured from a medium textured gray chert. This piece is lenticular in cross section, retains a convex base and has a thickness of 7 mm. Another artifact is a midsection of a small bifacially flaked blade made from a medium to finely textured white chert. This specimen is lenticular in cross section with a thickness of 4 mm and is probably a portion of a small, narrow, unclassified, straight-edged projectile point.

The proximal portion of a very well made contracting stemmed projectile point was recovered from the base of the agriculturally disturbed stratum in X638. The chert from which the specimen was made is a very finely textured, thermally altered light gray stone. The shoulders of this specimen are noticeable although not

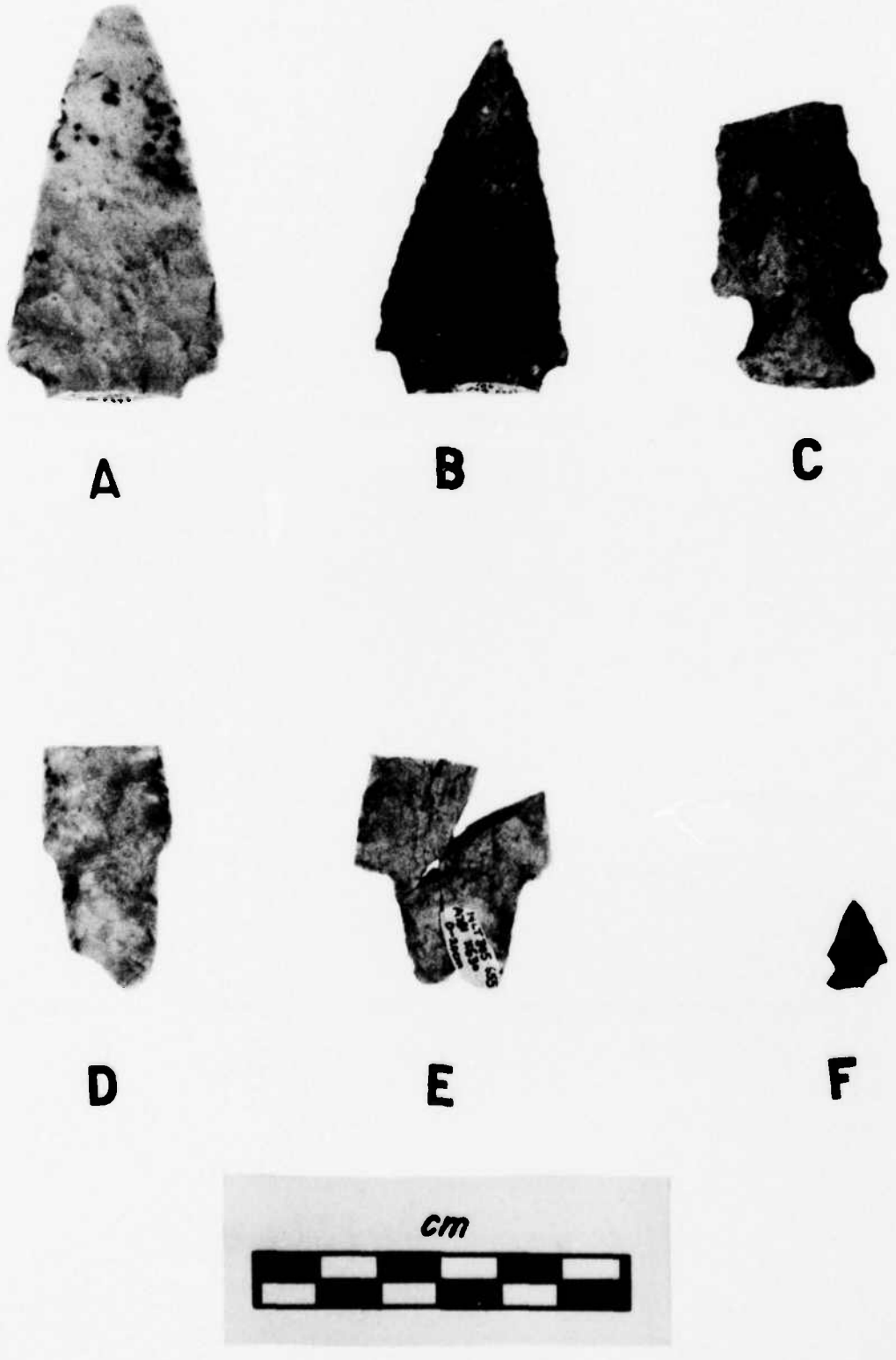


PLATE 6 Projectile points from 14LT305.
A - C, unclassified; D, Gary/Langtry; E, Langtry; F, Reed.

necessarily prominent. The blade portion is lenticular and appears to have had straight sides. The stem contracts to a straight or slightly convex base and has ground lateral margins. The artifact has been classified as the proximal portion of a Gary (Bell 1958: 28) or Langtry (Bell 1958: 38) which has a width of 22 mm, a thickness of 7 mm, and a stem length of 22 mm (Plate 6, D).

A small plain triangular point was also removed from the plow zone. This Fresno point (Bell 1960: 44) consists of a bifacially flaked medium textured tannish gray chert blade retaining straight sides and a straight base. Although the extreme distal tip of the artifact is missing, the projected length is 19 mm, the width is 14 mm and the thickness is 2 mm.

A small bifacially flaked side-notched projectile point was recovered from the plow zone in Area 781. The specimen was formed from a medium to coarsely textured grayish brown chert. In cross section the point is lenticular whereas the edges are straight and the base is slightly concave. This artifact is quite similar to those which have been classified as Reed (Bell 1958: 76) and has a length of 15 mm, a width of 10 mm, a thickness of 2.5 mm, and a stem length of 4 mm (Plate 6, F).

Below the cultivated stratum, four artifacts which can be identified as projectile points were recovered, of which three were featured. The single unfeatured artifact consists of a composite of three small segments which were recovered from three different, but adjacent, excavation units. During the analyses of the material from 14LT305, it was discovered that three pieces of worked chert were all portions of a single implement. The resulting composite artifact represents the proximal portion of a large bifacially flaked projectile point which was manufactured from a medium textured tannish gray chert. The reconstructed specimen consists of part of a blade which is lenticular in cross section and retains prominent shoulders with a contracting stem and concave base. The artifact may best be classified as a Langtry (Bell 1958: 38) projectile point (Plate 6, E) with a maximum width of 32 mm, a thickness of 6 mm, and a stem length of 18 mm.

At a depth of 21 cm below the surface, a well-made bifacially flaked triangular blade was recovered from X660. This specimen was manufactured from a light tan finely textured chert. The blade is thin, lenticular in cross section, and retains evidence of prominent shoulders. The distal tip and stem section are missing from the artifact and no other distinguishable typological

attributes are present. The projected length of the blade is 70 mm, the maximum width is 37 mm and the thickness is 6 mm (Plate 6, A).

A large bifacially flaked triangular blade was featured which was manufactured from finely textured, thermally altered chert. This well made rose gray specimen exhibits alternately beveled straight sides and prevalent shoulders. The stem portion is missing. Although opposite beveling is often associated with cutting implements, no wear patterns indicating usage as a knife could be discerned on this specimen. The artifact is too incomplete to classify as a projectile point type. The actual blade length of the specimen is 54 mm, the width is 32 mm, and the thickness is 7 mm (Plate 6, B).

From a depth of 22 cm in X658, a crudely flaked projectile point segment was recovered and is made from coarsely textured gray chert. This specimen exhibits prominent shoulders, which are a result of side-notching, an expanding stem, a convex base, a lenticular cross section, and straight sides. No distinctive marginal, secondary retouching is discernible along the edges. This specimen could not be classified into any particular projectile point type. The projected length of the artifact is 65 mm, the width is 29 mm, the thickness measures 9 mm and the stem length is 16 mm (Plate 6, C).

Bifaces

Numerous bifacially flaked blade sections were recovered from the surface and the upper 20 cm of Area 781. Most of these tool fragments have attributes which are traditionally associated with either large projectile points or knife midsections. These specimens are comprised of a variety of chert, some of which have been thermally altered. Most of the blade or tip sections are lenticular in cross section whereas others are plano-convex. The thickness of these artifacts ranges from 5 mm to 9 mm.

Collected from the surface of Area 781 was a bifacially flaked tool fragment. This implement section was made of light gray finely textured chert. The specimen has attributes characteristic of those tools which are usually classified as expanding stemmed drills. The blade or bit portion has parallel sides and in cross section, it is broadly lenticular or practically oval. The triangular proximal portion of this artifact expands at an angle of approximately 45 degrees from the bit or blade to the straight, extreme proximal margin. The dimensions of this drill section consist of a blade width of 10 mm, a thickness of 6 mm, and a basalar width of 25 mm (Plate 7, C).

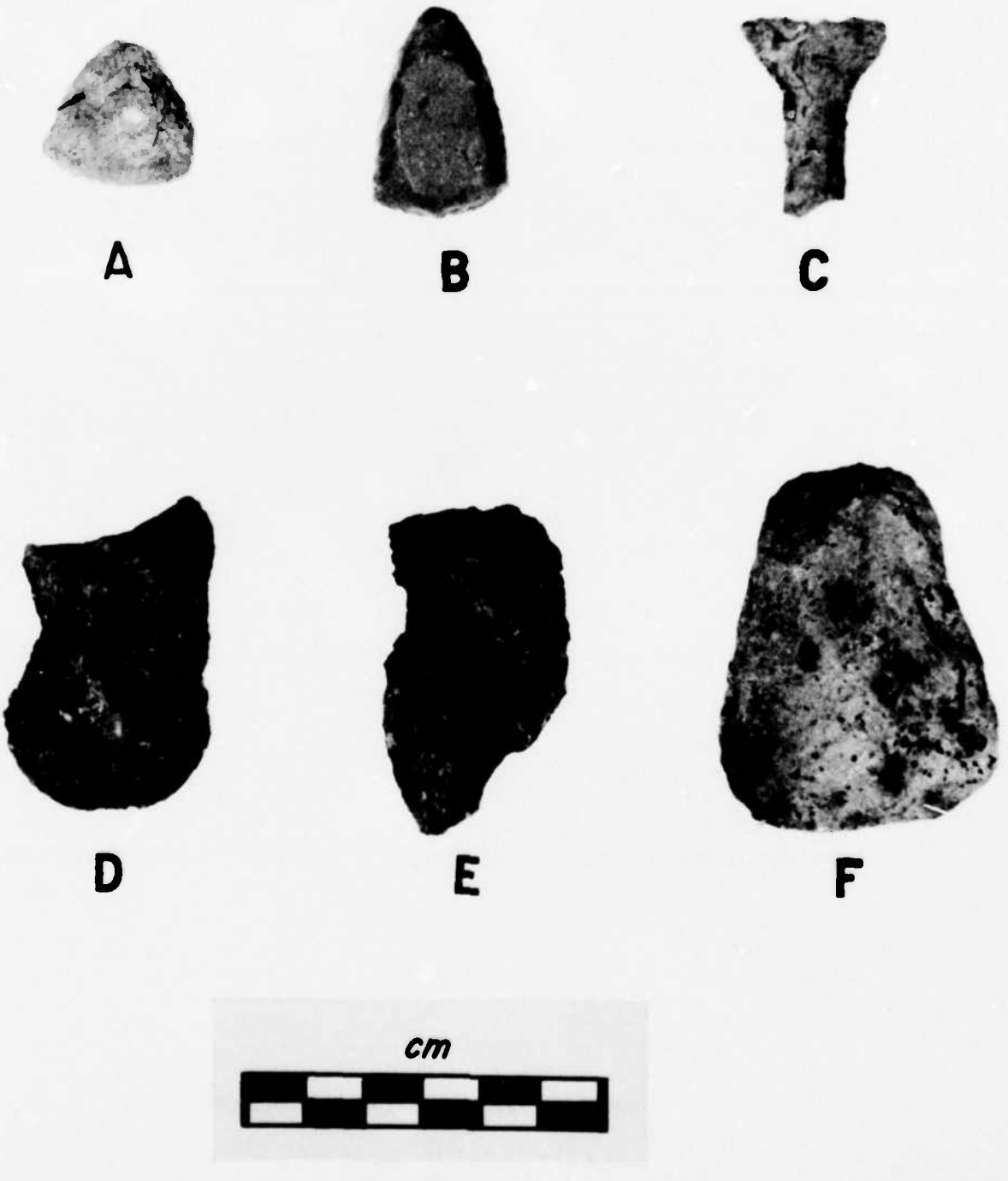


PLATE 7 Chipped stone specimens from 14LT305.
A - B, endscrapers; C, drill section
D - E, unclassified bifaces; F, small chipped celt

A small bifacially flaked celt was discovered at a depth of 30 cm in X638. This artifact was manufactured from a finely textured mottled gray chert. The faces of this implement are ovate with the broadest, or bit, end being convex and the opposite end, or poll portion, being smaller but more rounded. Overall, the celt is reasonably symmetrical with a lenticular cross section and scars of battering and crushing apparent along the lateral margins. Chipped chert celts are not characteristic of the general artifact assemblage found in the Big Hill vicinity. This specimen is somewhat atypical of Cuesta materials and also smaller than most chipped celts recovered from southeastern Kansas. The length of the celt is 61 mm, the maximum width at the bit is 46 mm, the minimum width is 26 mm at the poll, and the thickness is 18 mm (Plate 7, F).

Recovered in X631, from a depth of 27 cm, was a bifacially flaked specimen which had been made from the locally occurring fossiliferous chert. The artifact retains cortex or weathered rind over approximately 25% of its surface. Only one edge, an end, exhibits any modifications resulting from intentional flaking. The worked section has been beveled to approximately a 45 degree angle on one face whereas the opposing face is basically plano. The remainder of both faces are irregularly ragged in plan view. Although this specimen is somewhat of an eccentric, or specialized tool, it does retain attributes which are suggestive of an endscraper. The length of this tool is 54 mm, the width is 32 mm and the thickness is 19 mm (Plate 7, D).

Another crudely chipped biface was discovered at a depth of 30 cm. This specimen is of local chert and exhibits two bifacially flaked ends, the remainder of the artifact is very irregular and is either weathered or covered by cortex. There are no indications that the artifact was intentionally retouched or underwent extensive usage. This specimen has been generally classified as a crudely flaked biface. The length is 57 mm, the width is 31 mm, and the thickness is 17 mm. (Plate 7, E).

Unifaces

Two traditionally recognized endscrapers were recovered from Area 781 of the site. One is a unifacially flaked plano-convex endscraper, which was manufactured from a finely textured, thermally altered, buff-tan chert, was recovered from the plowed stratum of X579. The distal end of the implement is steeply beveled and also broad in relation to the overall length. Both lateral margins of the specimen have been smoothed by intentional grinding or wear. The length of the scraper is 25 mm, the width is 26 mm, and the thickness is 8 mm (Plate 7, A).

The other endscraper was found lying just below the cultivated zone in X659 and made from a finely textured, possibly thermally altered gray chert. This specimen exhibits unifacial modifications along all edges of the dorsal face. These edges are steeply beveled except for the proximal end. In cross section, the faces are plano-plano although the ventral surface is slightly concave longitudinally. The length is 31 mm with a width of 23 mm and a thickness of 8 mm (Plate 7, B).

Core Remnants

A core remnant of finely textured and thermally altered tan chert was discovered just below the agriculturally disturbed stratum in X659. Flake removal scars are apparent on all faces although a weathered rind is evident on most of one face and approximately one-third of another. In cross section, the artifact is basically triangular. The length of the core remnant is 77 mm, whereas the width is 52 mm, and the thickness is 27 mm.

Feature 266, a medium sized core remnant, was recovered at a depth of 25 cm from X629. This specimen of local chert has had flakes struck from four irregular faces. One face of this artifact retains evidence of weathering whereas a portion of another retains cortex. The overall length of this irregular core is 59 mm, the width is 38 mm and the thickness is 27 mm.

Modified Flakes

Ten distinctly modified flakes were collected from the surface of Area 781. One specimen is a medium sized flake of medium textured dusky white chert which retains evidence of unifacial flaking along one lateral edge. In cross section, the flake is plano-convex with a longitudinal keel. A 4 mm deep crescent shaped notch has been chipped near one end of the modified edge. The overall length of this modified flake is 31 mm, with a width of 22 mm, and a maximum thickness of 6 mm.

The other intentionally chipped flake recovered from the surface retains evidence of unifacial flaking along one unbroken edge. This specimen is of finely textured thermally altered chert and is plano-convex in cross section. The convex face of the artifact exhibits various flaking scars. The length of the specimen is 32 mm, the width is 25 mm, and the thickness, 6 mm.

Four modified flakes were recovered from the agriculturally disturbed stratum of the area. One unifacially flaked specimen of coarsely textured grayish brown chert was retrieved from X599.

This piece is plano-convex in cross section with a longitudinal keel on the convex face. The unbroken edge, which parallels the keel, is unifacially flaked. The length of the artifact is 24 mm, the width is 23 mm, and the thickness is 5 mm.

From X608, a modified tertiary flake of finely textured banded gray chert was recovered. Unifacial flaking is evident along an unbroken convex edge of this specimen. The cross section is plano-convex with the flaking scars being retained on the slightly convex face. The length, width, and thickness are 22 mm, 20 mm, and 5 mm respectively.

A large modified flake of thermally altered tannish pink chert was found in the upper 20 cm of Area 781. Unifacial flaking is exhibited along approximately half of the curved edge of the specimen. In cross section, the artifact is plano-convex with the convex face having a keel. The practically straight, once broken edge of the artifact shows indications of marginal battering and crushing but no distinctive wear. This modified flake is suggestive of a scraping implement and has a length of 42 mm, a width of 33 mm, and a maximum thickness of 8 mm.

Below the plowed zone in X639, a unifacially modified flake of finely textured mottled tan chert was recovered. The specimen is lenticular in cross section and exhibits flaking scars and some wear along its three unbroken edges. In cross section, the flake is plano-convex and the two faces are basically triangular. The length measured from the broken end to the rounded worked tip is 22 mm. The width of the artifact is 26 mm whereas the thickness is 4 mm.

A modified irregularly shaped medium sized tertiary flake of thermally altered, finely textured, tannish pink chert was recovered from the 20 cm to 30 cm level of X660. Practically all of the marginal edge of this specimen exhibits unifacial modification, as does one face of the flake. In cross section, this artifact is plano-plano. The function of this modified flake cannot be determined. The diameter of this artifact is 23 mm and the thickness is 3 mm.

A large tertiary flake of medium textured light gray chert was discovered just below the plow zone. This modified flake exhibits marginal modification along one lateral edge. Longitudinally, the artifact is concave-convex in cross section with large flake scars being apparent on the convex face. One end of the artifact is rounded whereas the other is more pointed and still retains the striking platform. The length of the flake scraper is 52 mm, the width is 28 mm, and the thickness is 4 mm.

From a depth of 30 cm in X629, a large modified secondary flake of medium textured banded light gray chert was recovered. This specimen has unifacial percussion flaking along one edge with no indications of secondary pressure retouching or definitive wear or usage patterns. The length of this modified flake is 73 mm, the width is 50 mm, and the thickness is 15 mm.

Debitage

A total of 649 miscellaneous chips and flakes were recovered from Area 781 of 14LT305. None of these specimens exhibit any intentional chipping modifications although they do represent the largest percentage of the cultural material. These lithic pieces have been generally classified and represent a variety of cherts which are not found locally. Of the 651 specimens found within the area, 25 were collected from the surface, 538 were recovered from the agriculturally disturbed zone, and 86 were discovered between 20 cm and 30 cm below the present surface. Indications of thermal alterations were apparent on 72 of the pieces.

The locally occurring gray fossiliferous chert provides the lithic inventory with the most specimens. From the surface, 15 pieces of the local material were collected of which two were primary flakes, ten were secondary, and three were tertiary chips. The top 20 cm of Area 781 yielded 351 fragments of field chert which consist of 89 primary chips and flakes, 73 secondary pieces, 110 unaltered tertiary forms plus 74 cobbles and spalls. Indications of thermal alteration could be discerned on 35 of the above specimens. Of the 86 pieces of debitage recovered from the 20 cm to 30 cm level, 53 were of the locally occurring field chert. This chert was represented by three primary flakes, 12 secondary flakes, 13 tertiary flakes and chips plus seven weathered chert cobbles and 18 chert spalls.

Another general classification for unmodified lithic material is that of gray chert. Most of this type of chert can be more specifically classified as Florence or Kay county, a banded variety of Florence, which outcrops to the west within the Flint Hills region. These gray specimens primarily are finely textured chert and may contain banding of lighter or darker gray hues. From the surface of Area 781, five gray specimens were collected which consist of two secondary flakes and three tertiary flakes. One of the tertiary flakes retains indications of thermal alteration. From the upper 20 cm, or the agriculturally disturbed area of the site, 90 gray pieces of chert were recovered. Of these unmodified fragments, four are primary flakes, eight are secondary flakes, and 78 are tertiary chips and flakes. Nine of the tertiary specimens

exhibited evidence of being either intentionally or unintentionally heated. In the depths ranging from 20 cm to 30 cm below the present surface, 18 pieces of gray chert were recovered which included one primary flake, five secondary flakes and 12 tertiary chips and flakes. One of the secondary specimens had undergone thermal alteration.

A white chert of primarily fine texture is commonly found at prehistoric habitation and campsites within the limits of the Big Hill lake basin. This sort of material is not uncommon for the southeastern Kansas region and is presently considered to be transported directly, or by trade from regions east of Kansas. The artifacts manufactured from the white chert usually exhibit marks of refined craftsmanship. Most debitage or rejectage consisting of this white, finely textured chert is primarily comprised of small tertiary chips and flakes. From the surface of Area 781, five specimens of white chert were collected and one specimen is a secondary flake whereas the others are tertiary flakes. The agriculturally disturbed stratum yielded 57 pieces of which two are small primary flakes, one is a secondary chip, 48 are tertiary, and 6 are thermally altered tertiary specimens. Three tertiary flakes were recovered from the 20-30 cm level.

A variety of finely textured light brown or tan chert, which is not indigenous to the immediate area, is also represented at 14LT305. Some of the worn and weathered chert river cobbles, which are found in the vicinity do contain an interior matrix which is similar to the tan debitage. Specimens of the tan chert are absent from the surface collections of this site. From the plowed zone of Area 781, the tan chert is represented by 35 pieces of which one is a primary flake, eight are secondary, 17 are tertiary, and nine show indications of having been thermally altered. The 20 cm to 30 cm level yielded 12 tertiary specimens of which six have been thermally altered.

Another general classification has been utilized, to include specimens of finely textured pink chert. These specimens were probably gray or white while in their natural state, but have been thermally altered to a pinkish hue. Four of these pieces are tertiary specimens and one is a secondary flake, all of which were recovered from the agriculturally disturbed zone lying between the surface and the 20 cm depth.

Ground Stone

Other specimens of modified and unmodified stone primarily consist of fragments of naturally occurring sandstone, limestone, hematite and limonite. Some small tabular fragments of both burned and unburned sandstone have been directly or indirectly ground or smoothed by a variety of human activities into artifact materials.

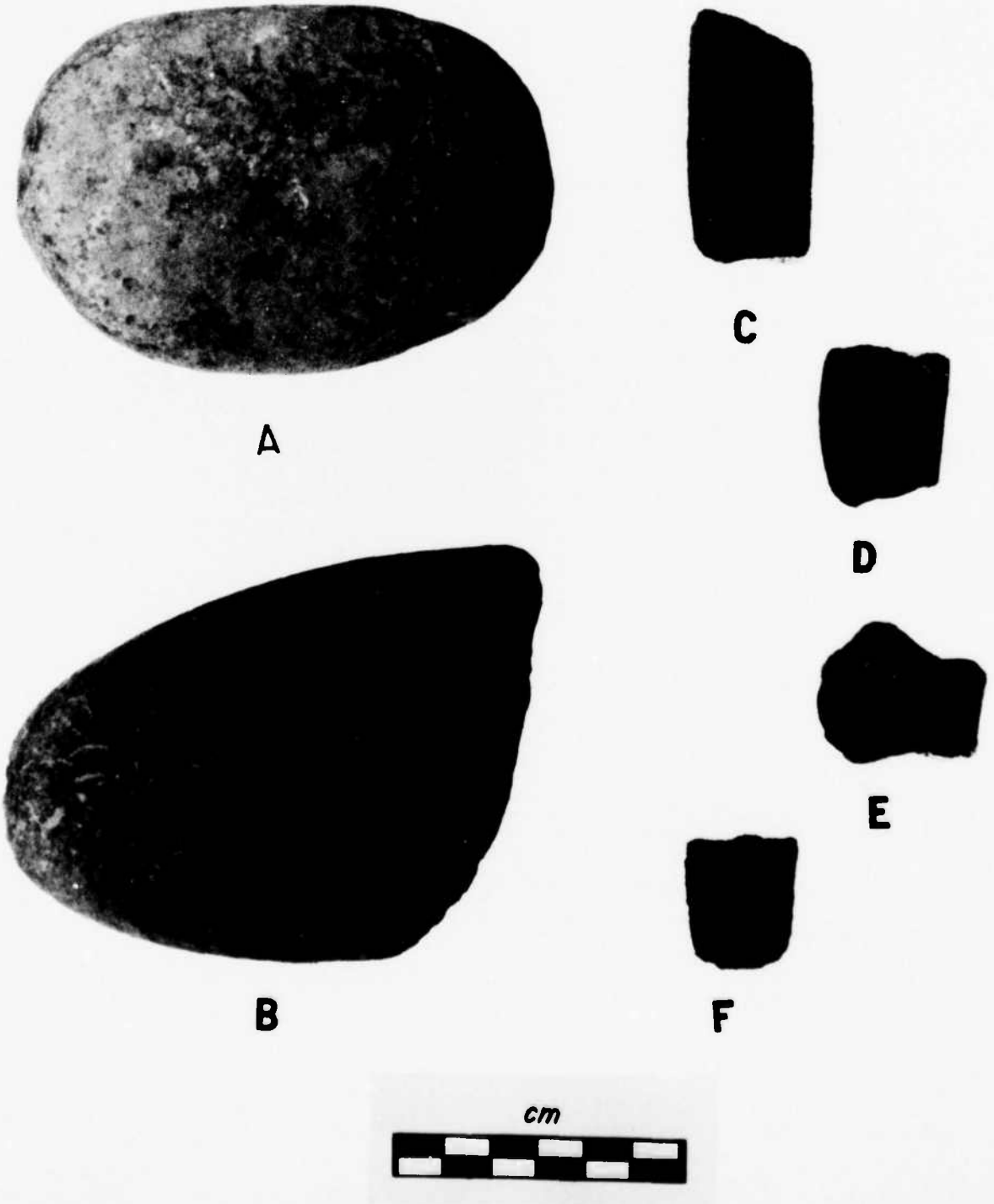


PLATE 8 Ground sandstone implements from 14LT305.
A, mano; B, mano fragment; C - F, abrader fragments.

Two unifacially smoothed fragments of the locally occurring sandstone were collected from the surface of Area 781 of 14LT305. One specimen appears to be a small unburned portion of a grinding slab. The other artifact is a fragment of a mano or handstone which was probably utilized as a milling or grinding implement. This artifact has one broken face and a smoothed or ground face. The sides or edges, which taper to the rounded end of the tool, appear to have been pecked with another stone for shaping, but left unsmoothed. This mano fragment appears to have been slightly burned. The only measurements obtained from this tool fragment are the width of 82 mm and the thickness of 38 mm (Plate 8, B).

From the upper 20 cm of Area 781, four unifacially smoothed fragments of burned and unburned locally abundant sandstone were recovered. Three of the specimens retain no indications of having been intensely heated nor do they retain any distinctive wear patterns which would suggest the function of the artifact. All of these artifacts have unifacial smoothing or grinding and may be portions of grinding slabs or whetstones. The lengths of these fragments range from 25 mm to 106 mm with the widths ranging from 25 mm to 64 mm and the thicknesses being from 11 mm to 35 mm. The fourth unifacially smoothed artifact found within the plowed zone is a fragment of burned sandstone. The smoothed portion of this specimen dips slightly, suggesting it may be a basin fragment of a grinding slab. The length of this artifact is 82 mm, the width is 75 mm, and the thickness is 28 mm.

Unifacially modified sandstone artifacts were discovered at a depth between 20 cm and 30 cm below the present surface. Two of the artifacts appear to be fragments of burned sandstone grinding slabs. Additional unifacially modified specimens were recovered from below the cultivation zone in X630. Both specimens are broken and weathered cobbles of unburned sandstone which contain a portion of a pecked hemispherical depression. Although these two specimens could not be properly fitted for an accurate reconstruction, they may be parts of the same fist sized nutting stone or anvil stone. The dimensions of the depression are 38 mm in diameter with a depth of 12 mm.

Four abrader fragments were discovered below the surface in Area 781. All of these artifacts were made of unburned sandstone which is found in the Big Hill vicinity. Three of these specimens were recovered from the agriculturally disturbed stratum, two of which came from the upper 20 cm of X580. One abrader fragment retains three distinct grooves on two faces which are basically "V" shaped and one broad, shallow, smoothed depression on a third face. Since this tool is incomplete, the exact nature of the worked grooves may not be fully determined although it is possible the implement was utilized in abrading chipped stone tools and larger rounded items which were possibly made of bone, antler or wood. The "V" shaped grooves are roughly

parallel and range from 2 mm to 3 mm in depth and from 4 mm to 7 mm at the maximum or upper width. One face of the artifact contains two of the "V" grooves. The face opposite the two grooves contains the relatively large, rounded depression. This particular tool fragment is irregularly broken, but measures 35 mm X 32 mm with a thickness of approximately 22 mm (Plate E). The other abrader fragment from X580 exhibits four smoothed and rounded faces with one face exhibiting a "V" shaped groove, both ends of this specimen, have been broken. The groove has been worn to a depth of 3 mm and the maximum upper width is also 3 mm. The "V" shape of the groove is usually associated with abraders which have been utilized for grinding the edges of chipped stone implements. The length of this incomplete artifact is 35 mm, the width is 26 mm, and the thickness is 17 mm (Plate 8, D).

From the upper 20 cm of X660, a sandstone abrader fragment retaining "U" shaped grooves, on three faces was recovered. All of the grooves trend upward or are shallower near the unbroken end of the artifact as if the implement was utilized for abrading pointed tools of bone or wood. Two of the grooves are 5 mm deep and 10 mm wide whereas the third groove is 2 mm deep and 7 mm wide. The overall dimensions of the abrader fragment are a length of 53 mm, a width of 30 mm, and a thickness of 22 mm (Plate 8, C).

An abrader fragment was exposed at a depth of 29 cm which exhibits "U" shaped grooves on three faces. The remnants of two of the grooves are so deeply worn that they appear to be separated only by a narrow ridge. The deepest portion of the grooves are at the broken margin of the specimen or what was once the interior portion of the abrader, indicating a bone or wooden tool sharpener. One groove is 7 mm deep and 10 mm wide, another is 4 mm in depth and 8 mm in width whereas the third groove is relatively vague but measures 2 mm in depth and 7 mm in width. The overall dimensions of this abrader fragment are 27 mm, 21 mm, and 21 mm; length, width, and thickness respectively (Plate 8, F).

At a depth of 29 cm, Feature 280 was recovered from X608. This artifact is a unifacially ground mano or handstone made from unburned native sandstone. In plan view, the faces are oval. The ends and sides are rounded but are neither battered nor smoothed. A shallow, weathered depression is contained in approximately the middle of the unmodified face. The length of the implement is 110 mm, the width is 75 mm, and the thickness is 41 mm (Plate 8, A).

Some of the burned sandstone fragments found in association with the deeply buried hearth excavated along the creek bank exhibit modifications which were achieved by grinding or

smoothing. The sandstone pieces are of the thinly bedded, locally outcropping variety. One restorable sandstone grinding slab was recovered from the hearth fill. The fragments of this slab were found scattered in the southwestern corner of the burned stone complex. The in situ position of the smoothed fragments suggested that the grinding slab or at least one large portion of the implement was placed or thrown into the hearth, relatively unbroken. The overall dimensions of the burned, reconstructed grinding slab are a length of 58 cm, a width of 33 cm and a thickness of 7 cm. The grinding basin or bowl was pecked or ground to a length of 45 cm, a width of 22 cm, and a depth of 2.2 cm.

FAUNAL REMAINS

Numerous bone fragments were recovered from the excavation units in Area 781. These specimens primarily consist of small long bone fragments of large mammals. Only one fragment could be accurately identified as being associated with a particular species or element. That specimen was a distal portion of a right humerus from a Bison bison.

Portions of five molars were retrieved from the 20 cm to 30 cm depths of the site. Two of the tooth fragments were identified as deer and three were identified as bison.

From a hearth excavated along the left bank of Big Hill creek at 14LT305, three small, nonspecific, turtle carapace fragments were recovered.

SUMMARY AND CONCLUSIONS

The accumulative cultural materials recovered from 14LT305 suggest a single prehistoric occupation. Most of the artifacts were recovered from the agriculturally disturbed stratum, which primarily comprises the upper 20 cm of the site. The area of the site has been inundated by seasonal flooding of Big Hill creek several times within the last decade, subjecting the soil and the associated cultural remains to radical displacement. Hence, subsequent tillage of the soil, after flooding, provided additional adverse effects upon any in situ artifacts.

The recovered cultural materials are indicative of an Early Ceramic occupation by Plains Woodland people of the Cuesta phase. The ceramic inventory is comprised of both cord-roughened and plain wares, which are typically associated with the Cuesta phase within the Big Hill lake basin. Although the lithic assemblage from this site is somewhat limited, comparisons with other chipped stone inventories from Cuesta sites indicate similar and typical artifact forms.

No discernible evidence of prehistoric or historic structural remains such as postholes were discovered at 14LT305. The recovered cultural data do not indicate that the site was intensely occupied, or that permanent habitation ever existed.

Pits used to contain foodstuffs or refuse materials were not discovered at the site. The lack of these features possibly suggest ephemeral occupation(s) of the site, the absence of surplus foodstuffs, or seasonal occupation when the weather or soil was not conducive for storage below the ground surface. Another possibility for the absence of pits may be the result of both agricultural practices and flooding over, at least, the last century.

The vertical location of the relatively deeply buried hearth, along the left bank of the Big Hill creek, does not necessarily suggest the existence of a bicomponent site. Archeological data obtained from the 1976 testing and the subsequent 1978 investigations suggest that the burned limestone complex and other cultural materials recovered at 14LT305 were contemporaneous. Although no diagnostic artifacts were recovered from the hearth during the 1978 excavations, a clay-tempered, cord-roughened sherd was recovered from a depth of 18 cm during the 1976 testing, near the later discovered burned limestone complex. Composite soil profiles from the investigations indicate a northwardly sloping terrace surface which probably existed during the time of occupation and was leveled at a later time by alluvium deposition and/or possibly agricultural activities.

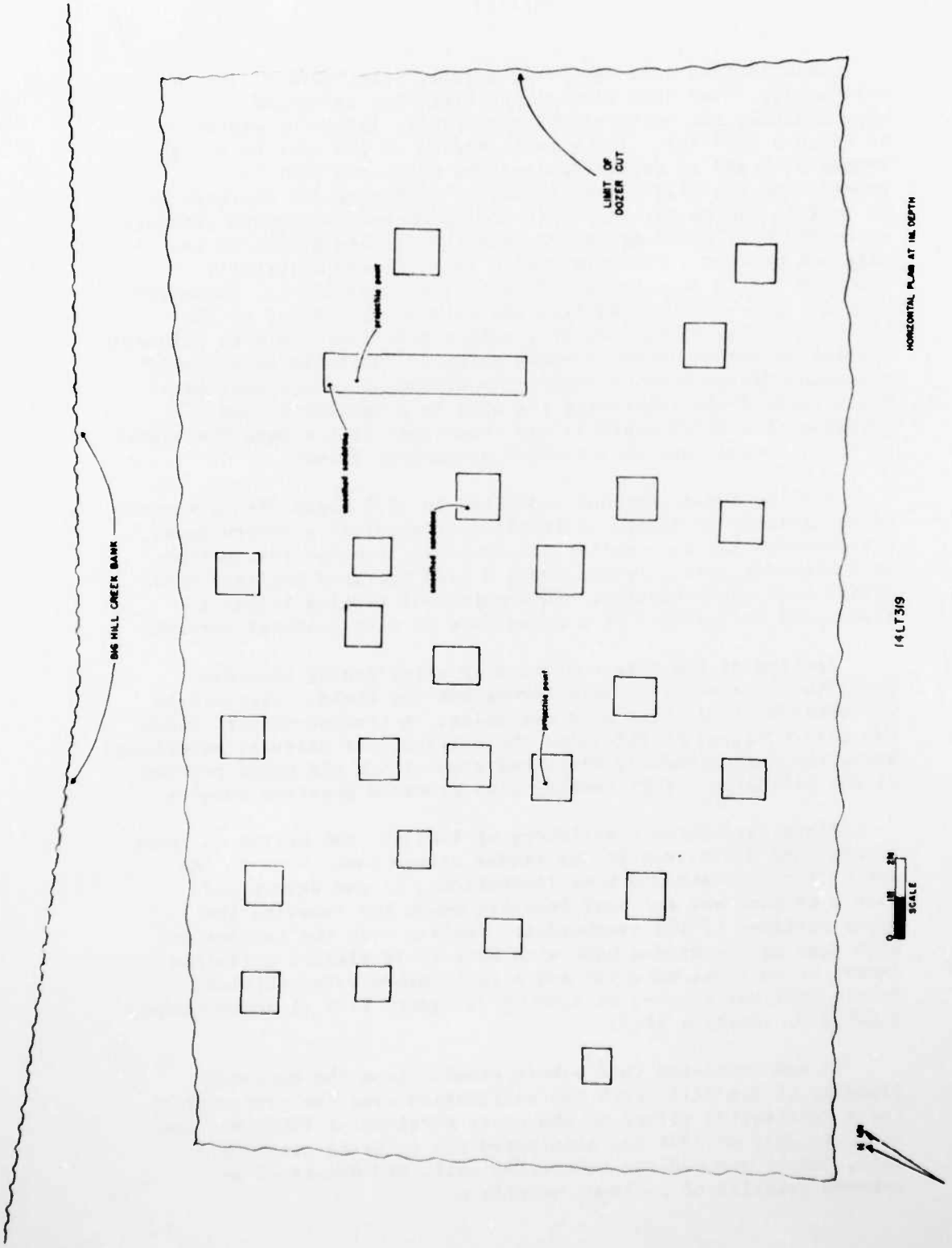


FIGURE 6 Distribution of excavation units at 14LT319.

14LT319

Site 14LT319 lies against the left, east, side of the Big Hill valley. The site area at one time, was estimated at approximately two hectares which generally lay at an elevation of 250.6 m (822 ft). The site is backed on the east by a high rugged hill and is bordered along the north and west by present-day Big Hill creek. Today no prominent stream terraces or terrace system exist on this now abandoned farmground although an eroded hill toe does extend into the eastern margin of the site and borders a silted slough. The site was originally reported to the Society in 1973 by a local collector. Undoubtedly, material has been removed from the site surface prior to the initial Society visit. Society collections from the site primarily consist of rather large, crudely chipped, chert implements which retain no distinctive or culturally diagnostic characteristics. Witty tentatively identified the area as a habitation and workshop site which possibly was associated with a late Preceramic or Early Ceramic occupation (KSHS Archeology Files).

Testing investigations conducted in 1976 began with a surface reconnaissance to locate indications of specific activity areas. Little surficial information was obtained from the examination so subsequent random testing with a hand operated Oakfield soil coring tool was conducted. This method of testing failed to reveal any indications of a subsurface in situ cultural stratum.

Testing of the site continued by establishing randomly distributed excavation units throughout the field. Little data was obtained from these hand dug units. A tractor-mounted blade was also utilized to determine the existence of cultural materials below the agriculturally disturbed zone within the major portion of the site area. This testing also provided negative results.

Along the northern periphery of 14LT319, two buried cultural strata were discovered in the eroded stream bank. Due to the depth of the strata and time limitations, it was determined that a backhoe was the most feasible means for removing the upper portions of the overburden. Testing with the backhoe and also shaving the eroded bank with hand tools yielded a limited amount of cultural material and a radiocarbon date, obtained from a charcoal sample, of 5,550 $\pm$ 215 years B.P. or approximately 3,600 B.C. (Buckley 1977).

It was concluded that severe erosion from the seasonal flooding of Big Hill creek and cultivation over the past century had a detrimental effect on the upper portions of 14LT319. The flood in July of 1976 had eliminated the existing cultivated zone, deeply scoured the underlying soil, and displaced an unknown quantity of cultural materials.

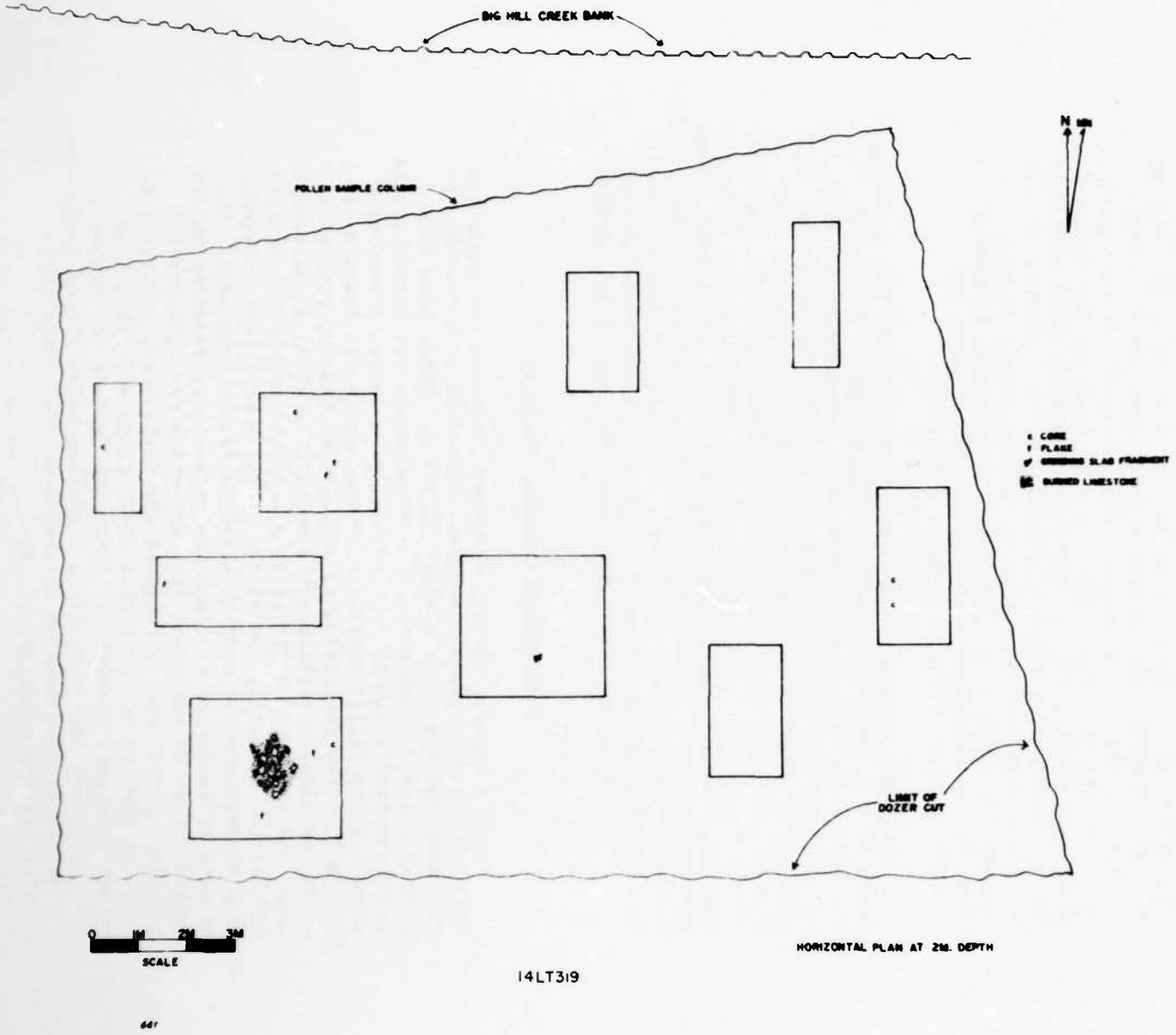


FIGURE 7 Map indicating the distribution of excavation units in the Archaic zone at 14LT319.

The 1978 investigations were concentrated in the northern sector of the site with the deeply buried strata. Heavy equipment was used to strip the overburden from the buried cultural components over an approximate 30 m X 16 m area. The removal of that overburden was constantly monitored until a depth of 75 cm below the present surface was obtained. At that point, small amounts of burned sandstone were observed and excavation units were established to be systematically lowered with hand tools. Twenty-five randomly placed 1 m X 1 m squares and one 4 m X 1 m unit were excavated to varying depths through extremely compact soil. The cultural materials recovered from the excavation units in the middle component were limited to a few lithic specimens (Figure 6).

After the component was adequately tested at the approximate depth of 1 m, heavy equipment was again used to remove the overburden from the underlying Archaic component. The overlying soil was scraped away until a depth of 1.7 m was obtained. At that depth, small fragments of fire reddened sandstone were observed and hand tools were again utilized during the remainder of the excavation. The soil at the 2 m depth was also extremely compact, and made digging extremely difficult and tedious. Nine excavation units, of various sizes, were established to adequately investigate the Archaic component. One cultural feature, small bone fragments, and a limited number of culturally affiliated lithic specimens were recovered from the units in the stratum (Figure 7).

INTERPRETED CULTURAL FEATURES

Small fragments of fire reddened limestone and sandstone were scattered throughout a relatively small area, exposed by the heavy machinery, at a depth of 1.7 m. Small hand tools were utilized to remove the fill from around the burned stones which eventually led to the exposing of a large, irregularly shaped, stone filled hearth which was designated Feature 118 (Plate 9). The dimensions of the exposed hearth, consisted of 145 cm along a north-south axis, 110 cm along an east-west axis, and a length of 225 cm in a northwesterly-southeasterly direction. Primarily the stones of the hearth were limestone with a scattering of various sized sandstone fragments. One particular sandstone specimen was unifacially smoothed and is suggestive of an implement fragment which was utilized for grinding or milling. Throughout the fill, small particles of charcoal and burned earth plus chert chips and fragmented animal bone were recovered. After the feature was exposed, and the burned stones removed, a shallow basin shaped depression was observed. The maximum thickness of the burned stone complex was approximately 20 cm.

PLATE 9 An exposed Archaic hearth at 14LT319; depth, 2 m.

ARTIFACT MATERIALS

Chipped Stone

Projectile Points

Two projectile point sections were collected from the surface at 14LT319. The first is the proximal portion of a large, crudely flaked, corner-notched point which was manufactured from a mottled gray, thermally altered chert. The expanding stem of this specimen has an uneven, slightly convex base. The shoulders of the blade are prominent, but do not appear to have been barbed. This artifact is lenticular in cross section and retains attributes which are similar to those of the Marcos (Bell 1958: 42) forms. The projected length of the implement is approximately 75 mm, the width is 39 mm, the thickness is 9 mm, and the stem length is 12 mm (Plate 10, C). The other specimen is a basalar section of a point, which was made from a medium to coarsely textured black flint. The stem portion of this piece expands slightly to the slightly convex base. In cross section, the artifact is lenticular with a 6 mm thickness.

Two medium sized dart points were recovered from approximately 1 m deep. One artifact is a bifacially flaked projectile point which has been manufactured from a finely textured, thermally altered, pinkish tan chert. The triangular blade is corner-notched and exhibits slightly barbed, prominent shoulders. One edge of the blade is straight whereas the other is convex. The convex edge may have resulted from breakage or extensive usage since one portion of the edge retains evidence of crushing and/or battering and another portion of that same edge has been worn or ground. The stem expands to an almost straight base. In cross section, the artifact is lenticular. This specimen has attributes which are most similar to those projectile points of the Ellis (Bell 1960: 32) type. The length of the artifact is 43 mm, the width is 25 mm, the thickness is 7 mm, and the stem length is 12 mm (Plate 10, A).

The other implement is a somewhat crudely flaked projectile point. This bifacially flaked artifact was manufactured from thermally altered finely textured, rose tan chert. The blade of the specimen is triangular, lacks shoulders, and contracts to a short and somewhat nondistinct stem. The base of the specimen is straight. The edges of the blade are slightly convex and do not exhibit any indications of marginal retouching. In cross section, the artifact is roughly lenticular with one

face being steeply convex and the opposing face only slightly convex. This specimen is quite similar to those points which are classified as Desmuke (Bell 1960: 30). The length, width and thickness are 46 mm, 19 mm, and 8 mm respectively (Plate 10, B).

Bifaces

Two bifacially flaked chert blade sections were retrieved from the surface at 14LT319. One specimen was made from medium textured gray chert and cannot be classified into a tool or functional category. The faces of the artifact are ovate and exhibit multiple flaking scars. The absence of marginal retouching or wear is apparent along the edges. In cross section, this particular specimen is plano-convex and has a thickness of 11 mm. The length of the artifact is 44 mm and the maximum width is 26 mm.

The other was a midsection of a bifacially flaked blade and was also collected from the surface. This blade fragment was made from a finely textured, thermally altered, biege chert. In cross section the specimen is lenticular with a thickness of 9 mm. The width of the fragment is 39 mm.

Other Categories

No unifacially flaked specimens, core remnants, or modified flakes were recovered from the excavation units during the 1978 investigations.

Debitage

Compared to the other sites investigated within the limits of the Big Hill lake basin, few specimens of debitage were recovered from the cultural strata at 14LT319. A total of 60 nondiagnostic lithic pieces were recovered from 35 excavation units. Intensive monitoring during the scraping activities did not increase the debitage inventory.

From the depth of approximately 2 m, a total of 49 pieces of debitage were recovered. Of this total, 43 specimens are the medium to coarsely textured local gray chert of which 23 are primary, 12 are secondary, and 8 are tertiary pieces. One tertiary specimen of a finely textured gray chert, which may be of the Florence variety, was recovered. Five tertiary pieces of finely textured black chert are included with the inventory. Black chert specimens are not usually found at the sites within the lake basin.

A

B

C

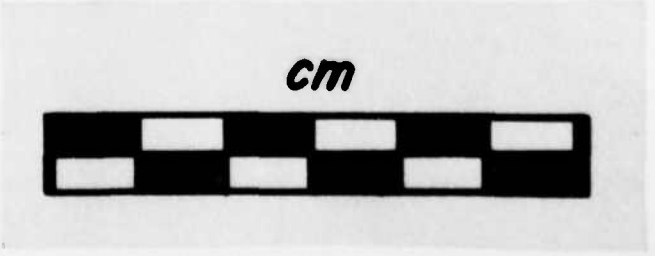


PLATE 10 Projectile points from 14LT319.
A, Ellis point; B, Desmuke point; C, Marcos point.

Ground Stone

Ground stone recovered from the excavation of 14LT319 consists entirely of modified sandstone fragments. All of the sandstone specimens are of the locally outcropping, finely grained variety.

Two grinding slab fragments were recovered from the backdirt as a result of the scraping activities conducted by heavy machinery. These unburned fragments had been unifacially smoothed to form a shallow depression for a grinding basin. The thickness of the fragments are 25 cm.

A specimen designated as Feature 110 was recovered from a depth of 119 cm below the present surface. This feature consisted of a portion of grinding slab which retained a smoothed concave depression. The thickness of this artifact is 15 mm. Another specimen, Feature 111, is morphologically similar to the preceding artifact. This slab fragment lay at a depth of 114 cm and had a thickness ranging from 20 cm to 23 cm.

A burned sandstone fragment was recovered from a depth of 2.25 m. This specimen has a plain, smoothed face and a thickness of 19 mm.

FAUNAL REMAINS

Primarily, the faunal remains from 14LT319 consist of small, unidentifiable bone fragments which were recovered from the hearth, Feature 118, in the Archaic stratum. Two specimens from that feature were identified as probably being bones of antelope. One specimen is a left medial phalanx and the other bone is identified as a right carpal.

SUMMARY AND CONCLUSIONS

14LT319 was a tricomponent site dating from approximately 3,600 B.C. to the Early Ceramic period of approximately A.D. 700. The most recent, or surface component had suffered radical soil displacement for at least the last decade. The original significance of the component could not be determined due to the lack of in situ cultural features and the limited amount of recovered cultural materials.

The cultural stratum which was buried at an approximate depth of 1 m contained artifacts having Early Ceramic traits. Although no ceramic fragments were recovered during the 1978 investigations, a pottery sherd was discovered in this level when testing of the site was being conducted in 1976. The scarcity of cultural material in this component may be indicative of an ephemeral camping locus.

The lowest component, which lay at a depth of approximately 2 m, contained no culturally diagnostic artifacts. The age of this assumed Archaic component was determined by a radiocarbon date of a charcoal sample obtained from a hearth. Although another limestone filled hearth was exposed in 1978, the charcoal fragments were so small and dispersed throughout the fill that an adequate sample could not be collected. The lack of diagnostic artifacts within this component suggest a short lived or temporary camp which was utilized during a Preceramic period.

14LT326

Site 14LT326 was recorded in 1977 during an archeological survey of a county road project for a new bridge and rechanneling of Big Hill creek just below the then proposed dam site of Big Hill lake. That work was carried out by the Society for Labette county. This prehistoric site lies upon a stream terrace along the left bank of Big Hill creek, north of an east-west county road and just south of the dam axis. The location is SW¼, SE¼, SE¼, Section 7, T32S, R18E. The area containing the most cultural material lies at an elevation of 247.8 m (813 ft). The site was beyond the limits of the road project, but it was within the construction limits of the lake project (Figure 2).

During a survey of opportunity in 1977 additional cultural material was collected from the surface of the site. At that time, the area had been recently plowed, which provided excellent surface visibility. Previous surveys had been greatly handicapped by lush growth of fescue grass. This pedestrian reconnaissance of the area helped provide the information needed to formulate plans for further investigations of the site prior to its destruction or impact by construction activities. During that visitation, the spatial extent of cultural materials indicated that the site could be arbitrarily divided into subareas to provide a more effective control of the general site study.

AREA 781

Area 781 was defined as lying north of an arbitrary east-west line of the 233,000 ft designator of the Kansas coordinate system, south zone (Lambert conformal conic projection; U.S.G.S. Dennis Quadrangle). Topographically, this line extends across 14LT326 to the east from a left meander of Big Hill creek to the 810 feet contour, or approximately 20 m east from the bank of the creek to the upper margin of a southwardly trending slough.

A grid system of 2 by 2 m squares was established within Area 781. Each square in the grid was consecutively numbered from east to west then west to east on alternating tiers within the limits of the designated area. The initial subsurface investigations began at the southeastern corner of the grid in Area 781 by excavating a cluster of eight squares and leaving the unexcavated center 2 X 2 m square as a control unit (Figure 8).

The eight squares were excavated to a depth of 40 cm below the present ground surface. It was determined that the upper 20 cm of Area 781 had been disturbed by agricultural related activities. After the top 20 cm, or the plow zone, was removed the squares

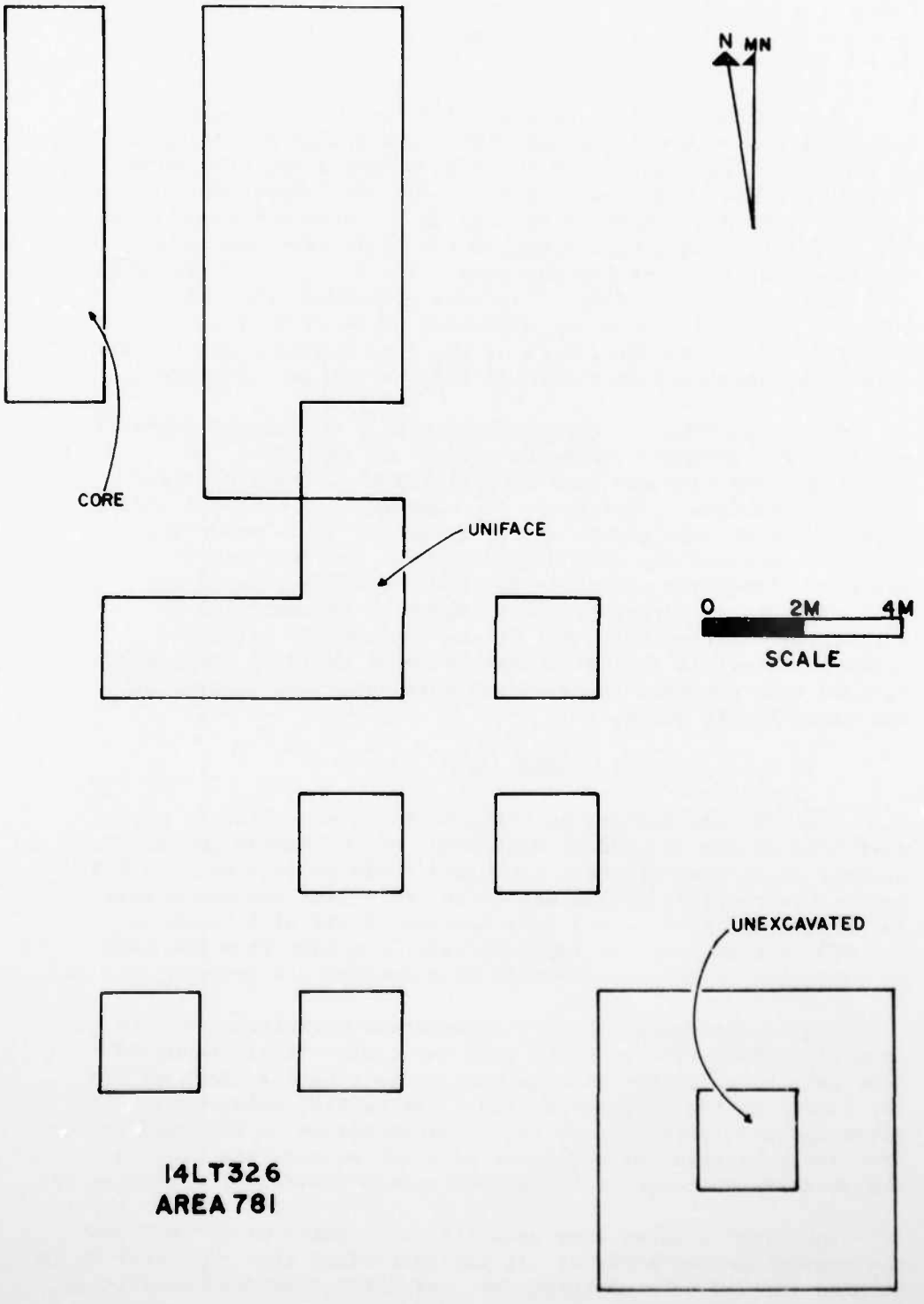


FIGURE 8 Map of excavation units in Area 781 at 14LT326.

were excavated in arbitrary 10 cm levels to a depth of 40 cm. At that depth, a culturally barren silt loam soil stratum was exposed. A hand-operated Oakfield soil coring tool was then utilized to obtain soil samples from below the excavation floors, when possible. At times, the samples could be obtained from as much as 45 cm below the excavation floors or approximately 85 cm below the present surface of the site. In other instances, due to the compactness and dryness of the soil, only a total depth of 60 cm from the surface could soil samples be extracted. No indications of cultural remains were observed below the 40 cm depth.

From the cluster of the eight excavated units, the area of subsurface investigations was expanded to the west and to the north. The additional squares were randomly selected for excavation to determine the presence and/or abundance of any remaining prehistoric cultural materials.

Only small amounts of cultural materials were discovered within Area 781 although 30, 2 by 2 m squares were excavated to a depth of 30 cm or more. Twenty-five percent of Area 781 at 14LT326 was excavated with additional subsurface sampling being conducted with a hand-operated Oakfield soil coring tool. Those tests had negative results in detecting evidence of a significant intact prehistoric occupation stratum or associated cultural features.

Most of the cultural material was recovered from the upper 20 cm of the area. This upper zone had been subjected to various sorts of disturbances during the last century including timber clearance, agricultural and grazing activities, plus inundation and erosion from the seasonal flooding of Big Hill creek.

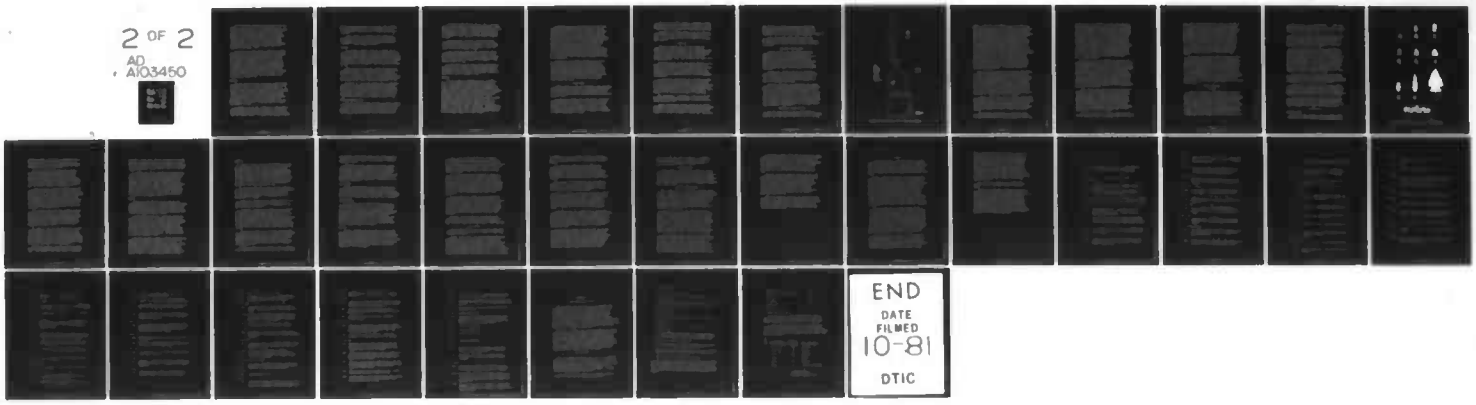
ARTIFACT MATERIALS

Chipped Stone

Projectile Points

Three projectile points were recovered from Area 781. The proximal portion of a medium sized, plain, triangular projectile point was recovered from the surface of Area 781. This rose-gray specimen has been thermally altered. The sides of the blade are slightly convex and the base retains a shallow notch. Both faces retain indications of having been thinned by pressure flaking. The distal tip of the point is absent. This projectile point may best be classified as a slightly modified Fresno (Bell 1960: 44). The projected length of the specimen is 30 mm with a width of 19 mm and a thickness of 2 mm (Plate 11, E).

AD-A103 450 KANSAS STATE HISTORICAL SOCIETY TOPEKA ARCHEOLOGY DEPT F/G 5/6
THE 1980 ARCHEOLOGICAL INVESTIGATIONS AT THE BIG HILL LAKE, KAN--ETC(U)
JAN 80 D D ROWLISON
DACW56-78-C-0151
UNCLASSIFIED NL



The agriculturally disturbed zone, consisting of the uppermost 20 cm of the area, yielded two artifacts which are classified as projectile points. One specimen was manufactured from the locally occurring mottled gray fossiliferous chert. The blade is triangular with straight sides and exhibits evidence of corner-notching; the distal tip of the blade is missing. In cross section, the blade is roughly triangular with one face being slightly convex and the other being extremely convex. The stem is 6 mm in length and expands to a straight base. This point has attributes similar to those points which are recognized as Scallorn (Bell 1960: 84) with a projected length of 29 mm, a width of 11 mm and a thickness of 5 mm (Plate 11, G).

A projectile point was recovered from the 20 cm to 30 cm level in X126. The point has been manufactured from a finely textured gray chert of the Florence variety. The blade form is triangular with long, narrow faces and corner-notching. The specimen has an expanding stem and a convex base. In cross section, the artifact is plano-convex. The convex face exhibits flaking scars over all of its surface whereas the opposing face has modifications resulting from flaking only along the lateral edges. The plano or unmodified face is slightly concave longitudinally whereas the flaked face is convex from end to end, thus making the middle portion of the blade significantly thicker than either end. Although this point shares some attributes which are similar to the Scallorn type (Bell 1960: 84) it is not classified as any particular type (Plate 11, H).

Bifaces

From the upper 20 cm of X94, a bifacially flaked biconvex implement was recovered. This artifact was made from a finely textured white chert. One ovate face exhibits evidence of pressure flaking whereas the opposing face appears to have been flaked by percussion methods. Indications of usage are apparent along the edge of this implement by the marginal smoothness created from scraping or cutting and areas showing evidence of crushing and battering resulting from chipping or pounding. This implement may best be classified as a modified core remnant since it does not fit into a particular tool category. The length of this artifact is 47 mm, the width is 35 mm and the thickness is 18 mm.

In an adjacent square, X95, a fragment of a large bifacially flaked blade was retrieved from the plow zone. This specimen has been manufactured from finely textured gray Florence chert. The blade fragment exhibits bifacial thinning and is essentially lenticular in cross section. The edges of this specimen have been

modified by retouching along opposing lateral edges, resulting in an alternately beveled blade. The unbroken end of the knife fragment is 86 mm, the width is 46 mm and the thickness is 11 mm.

A small fragment of a bifacially flaked implement was found in the 20 cm to 30 cm level of X127. This specimen is too incomplete for classification or for obtaining relevant measurements although it may be surmised that the artifact is a portion of a knife or projectile point.

Unifaces

Two unifacially flaked specimens were recovered from the agriculturally disturbed zone of Area 781. From the upper 20 cm of X66, a unifacially flaked tool fragment was discovered. This specimen, made from a medium textured mottled gray chert, exhibits a unifacially flaked, rounded end which is similar to the tapering proximal portions of plano-convex endscrapers. This tool fragment in cross section is plano-convex and both of the lateral edges are smoothed from wear or grinding. The thickness of the specimen is 4 mm.

Another unifacially flaked tool fragment was obtained from the plow zone of X115. This artifact is the distal portion of a plano-plano endscraper manufactured from a finely textured, mottled, tan and gray chert. Both the lateral and end margins of the tool fragment retain evidence of unifacial pressure flaking, although one lateral edge is more steeply beveled than the other. The thickness of this distal section of an endscraper is 4 mm.

At a depth of 21 cm below the present surface, a unifacially flaked artifact which had been manufactured from the locally abundant chert was featured. This large, irregularly shaped, secondary flake exhibits pressure flaking along one convex edge along with other attributes which are usually associated with those specimens classified as side scrapers. Both ends of the flake retain natural cortex. The length of this implement is 55 mm, the width is 36 mm and the maximum thickness is 12 mm.

Modified Chips and Flakes

Chips and flakes which have been modified by marginal flaking are represented by four specimens retrieved during the excavation of Area 781. These chips and flakes were classified either as unifacially or bifacially worked, of which three are the former and one of the latter are represented. Three modified pieces were recovered from the plow zone or upper 20 cm of the area.

A large unifacially modified, tertiary flake of thermally altered, finely textured, rust-tan chert was recovered from the upper zone of X21. Unifacial flaking is apparent along the 31 mm length of one lateral edge. Also along that same worked edge, the specimen has been polished from usage. This artifact may be classified as a flake tool or scraper. The total length of this implement is 42 mm, the width is 20 mm and the thickness is 7 mm.

A modified tertiary chip of local chert from X68 has bifacial flaking along one lateral convex edge. The flaking is somewhat irregular and is not indicative as to the function of the artifact. The length of this specimen is 26 mm with a width of 15 mm and a thickness of 6 mm.

A small unifacially modified flake of thermally altered, finely textured, pinkish-gray chert was recovered from the uppermost 20 cm of X94. This artifact could not be classified as to its function although it does exhibit pressure flaking along one lateral edge. The length of this specimen is 15 mm and the thickness is 3 mm.

A single modified tertiary flake recovered from the 20 cm to 30 cm level of Area 781 was a thermally altered specimen of tannish-gray chert. Evidence of unifacial pressure flaking lies along a portion of one slightly concave lateral edge, for a distance of 12 mm. The length of this artifact is 31 mm, the width is 23 mm and the thickness is 4 mm.

Debitage

Other lithic material recovered from Area 781 consist of chips, flakes, spalls and cobbles representing a variety of chert. These specimens were classified into categories of primary, secondary, and tertiary or interior flakes plus chert type if identifiable and noting whether the specimen had been thermally altered. All pieces are lacking any form of intentional modification such as marginal retouching or wear. The largest percentage of lithic debitage was derived from the locally abundant fossiliferous gray chert "field chert." Other miscellaneous specimens recovered at the site consist of several varieties of presently unidentified chert types. That is, chert which presently has not been standardly classified as being associated with any specific limestone formation or member and which also coincides with a particular geographic locality of some other system or nomenclature. Therefore, within the scope of this report, most of the unworked lithic materials were classified by color, texture and treatment rather than any specific geographic/geologic or "type" criteria.

A breakdown of the miscellaneous debitage is comprised of 180 chips and flakes from the 0 to 20 cm level of Area 781. Those specimens classified as primary consist of 28 pieces ranging in size from 5 mm to 60 mm. All but two of the primary chips and flakes are of the locally occurring "field chert" variety which is a medium to coarsely textured fossiliferous gray chert. The other two specimens are a gray, finely textured variety of Florence chert. The secondary chips and flakes are also primarily of the local chert with 24 representatives whereas others consist of one of the Florence variety, one finely textured white specimen, three tan pieces and one pinkish-tan specimen which indicates thermal alteration. Tertiary chips and flakes are comprised of 20 pieces of field chert, 39 of the Florence variety of which 11 have been heated, nine of finely textured black chert and a reddish-brown chert, 24 of a finely textured tan chert, one each of a soft yellow and a tan and white banded variety plus 13 pinkish-tan thermally altered specimens.

Comparatively few specimens of debitage were recovered below the depth of 20 cm. These 20 specimens primarily consist of tertiary chips and flakes of nonlocal origins, and one which appears to have been thermally altered. Only one primary flake of field chert was discovered at this level as were two large primary spalls of the same material. Two secondary flakes of the local chert were recovered from this level. Tertiary chips and flakes consist of three field chert specimens, two pieces of the Florence variety, one finely textured white flake, eight tan chips and flakes and one heated pinkish-gray flake.

Ground Stone

Thirteen fragments of burned and unburned sandstone implements, having indications of modification by grinding or smoothing, were recovered from Area 781. Some of these specimens exhibit only unifacial modifications whereas others are bifacially altered. All but one of the specimens were retrieved from the agriculturally disturbed stratum.

One plano-convex muller or mano section made of the locally outcropping sandstone was recovered from the 0 to 20 cm depth. This artifact shows no indications of having been extensively heated or burned. The convex face of the implement has been smoothed by grinding or polishing whereas the edges and plano face appear to be naturally weathered. One end of the specimen is rounded and the other end is broken. The width of the fragment is 74 mm and the thickness is 22 mm.

Four bifacially modified fragments of sandstone, from the uppermost 20 cm of Area 781, retained no indications of having been burned. These four specimens may have been a part of one or more grinding slabs ranging from 13 mm to 28 mm in thickness.

Six unifacially smoothed sandstone pieces were recovered from the plow zone and one burned piece was retrieved from the 20 cm to 30 cm stratum. Three of these fragments were not burned. All seven specimens have been classified as grinding slab fragments.

AREA 782

Area 782 of 14LT326 lies south of the 233,000 feet designator of the Kansas coordinate system, south zone, (Lambert conformal conic projection; U.S.G.S. Dennis Quadrangle 1973) and north of an east-west county road. Topographically this area is situated on an eroded stream terrace which lies along the left bank of Big Hill creek and just west of a southwardly trending slough. The elevation at the terrace crest is 247.8 m (813 ft).

Throughout the past century, the area has undergone various degrees of disruption from agricultural related activities. Some of those activities consisted of timber clearance, plowing, tillage for crop production, the grazing of livestock, the construction of pens for cattle confinement and developing a field access road. Consequently, the soil and the associated cultural materials had been displaced prior to the archeological investigations.

A lush growth of fescue covered all of the area designated as 782, which greatly restricted any surficial observations for indicators of prehistoric habitation. A road grader was utilized to carefully scrape away the grass and the agriculturally disturbed stratum along the crest of the eroded stream terrace toe. The scraping activity exposed a thin scattering of cultural debris lying below the plow zone. This scatter primarily consisted of chert debitage and fragments of burned stone.

When the presence of agriculturally undisturbed cultural materials was determined, a grid system of 2 m squares was established within the area which had been stripped, just west of the field access road.

Intensive investigations commenced within the area where a few fragments of burned limestone had been exposed by the scraping operations. From this point, the excavation area was expanded to eventually include 47 contiguous 2 m excavation units and encompass the principal habitation area of the site. The squares

were excavated by arbitrary levels of 10 cm. Additional expansion resulted in opening an additional 18 squares to the north and utilizing a scraper to remove the grass from approximately a 13 m by 13 m area to the south, where the cattle pens once stood before excavation with hand tools (Figure 9).

Most of the cultural features within Area 782 were discovered at depths between 20 cm and 25 cm below the present surface. This thin cultural stratum was interpreted as being the only discernible level of prehistoric activities at the site.

ADDITIONAL INVESTIGATIONS

Included as a part of the subsurface archeological investigations at 14LT326, two test excavations were conducted. The intent of these excavations was to provide additional data for the determination of the spatial extent of the site and to gain pertinent information concerning the presence of any prominent soil stratification within the area of the site. One test excavation was conducted along the western margin of Area 782 and another test excavation was placed in an area which was designated as Area 783.

An excavation to obtain a deep vertical profile was conducted along the left bank of Big Hill creek in Area 782. This excavation unit was 1 m wide and was dug to a depth of 3 m. The newly exposed profile indicated an absence of significant interpretive geological strata and no cultural deposits or materials were observed.

Area 783 of 14LT326 was described as being situated west of Area 782 at an elevation of approximately 247.3 m (810.8 ft), north of an east-west trending county road and south and east of the left bank of Big Hill creek. The topography of this locale suggested the possibility of an aboriginal activity area lying just to the east of the stream. A 1 m X 4 m excavation unit was placed in a shallow depression to test for subsurface cultural materials. The unit was 4 m along an east-west axis and 1 m along its north-south axis and was excavated by a depth of 50 cm below the present ground surface. This excavation unit contained no cultural debris nor could any deeply buried stratum limitations be delineated.

INTERPRETED CULTURAL FEATURES

The large burned limestone complex was assigned the designator of Feature 28. A small portion of this concentration was first observed during the scraping activities of the road

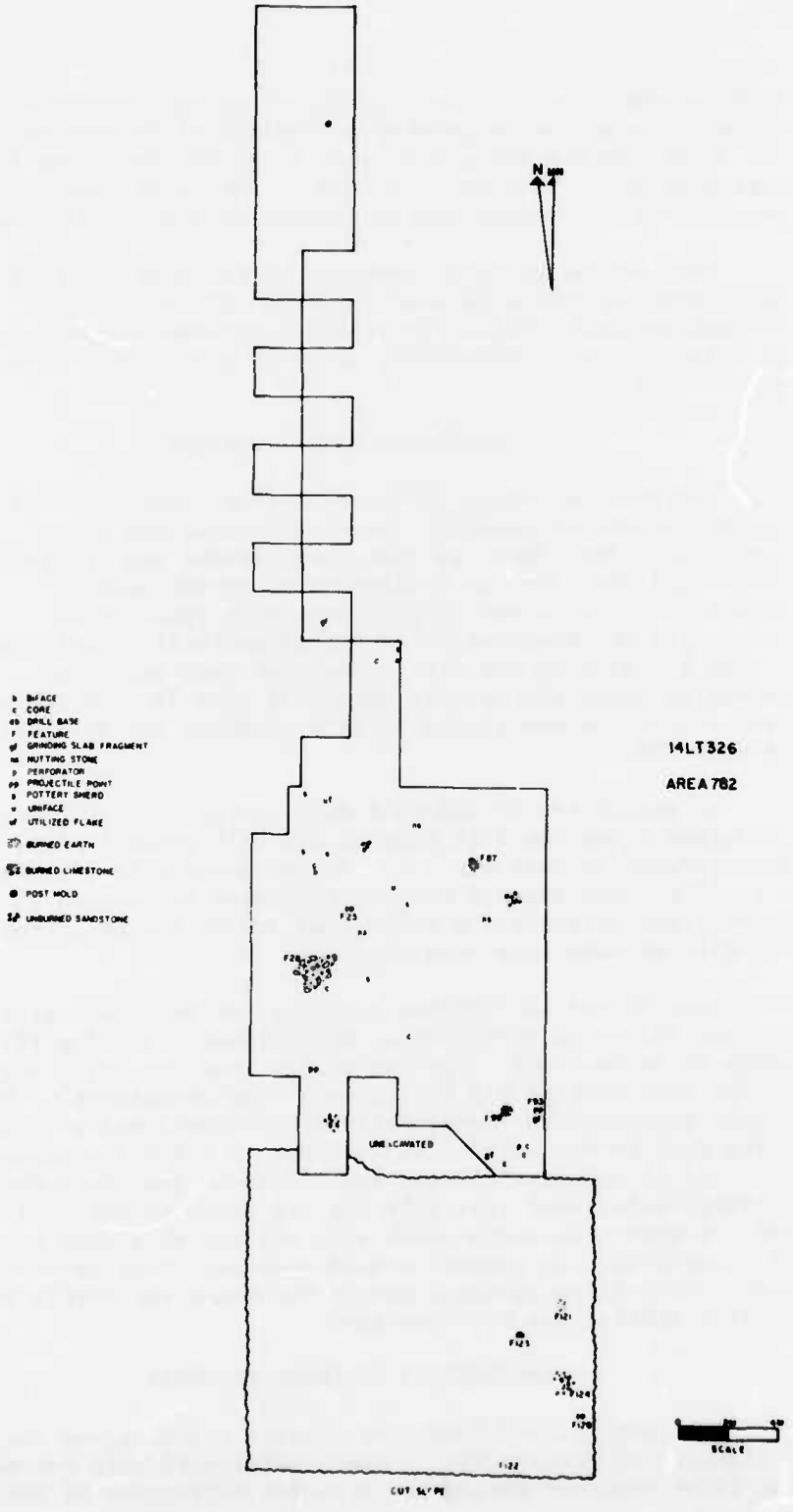


FIGURE 9 Map of excavation units in Area 782 at 14LT326.

grader. At that time, a fire-reddened piece of limestone was exposed at the lower contact line of the agriculturally disturbed zone. Controlled excavation of the feature began by using small hand tools to determine the spatial limits of the burned stone complex and to expose this feature for archeological interpretation. Although flecks of charcoal and burned earth were sporadically observed, intermixed with the fire-reddened limestone, the feature lacked any indications of having been burned in situ. After the exposure of the feature was completed, it was readily seen that the complex lay on a slight westward incline which indicated that during the prehistoric occupation of the site, the topography within the immediate vicinity was probably similar to that of today. Feature 28, being the largest of the burned limestone complexes at 14LT326, measured 68 cm along the north-south axis and 75 cm along an east-west axis. The thickness of the stone cluster was 16 cm and the largest stone within the complex was 21 cm by 11 cm. The soil surrounding and partially filling the feature was not suggestive of having been heated to any intensity or supporting an active hearth for any appreciable length of time. Cultural material found in association with Feature 28 consists of small flakes of chert, a tip section from an undiagnostic bifacially flaked blade, a few small fragments of burned and unburned bones and two small eroded pottery sherds.

Below the cultivated zone of X609 an irregular discoloration of orange fired earth was discovered. This was designated as Feature 87. Although the limits of the stain were not well defined, approximate measurements were 28 cm along a north-south axis and 34 cm along an east-west axis. The mixed orange soil of this feature contained very little charcoal and the small amount of recovered cultural material came from the uppermost limit of the stained area. The thickness of the burned earth lense was approximately 20 cm. Due to the recovery of a very small amount of cultural material and charcoal, and also the lack of a distinct pattern; this burned area, Feature 87, was interpreted as a hearth area which may have been cleaned shortly before the thin occupational stratum was abandoned.

A crescent shaped cluster of burned limestone, Feature 124, was exposed just below the agriculturally disturbed zone of X452. This particular feature was 70 cm along a north-south axis, 80 cm along an east-west axis, and approximately 12 cm in thickness. Burned earth and charcoal were not found in association with this burned limestone complex which indicates that the limestone cobbles were probably not thermally altered in this specific location.

Just below the plow zone in X541, a circular outline of dark soil containing charcoal and burned earth was uncovered. Throughout the excavation unit, and the square just to the south,

A scattering of charcoal, burned earth and other miscellaneous cultural debris was discovered at the same level as the upper limit of the feature. The dark, mixed stain was concentrated in an area approximately 30 cm in diameter and designated as Feature 99. Excavation of this feature began by first digging the eastern one-half of the stain in arbitrary 10 cm levels. The limits of the feature were determined by the absence of culturally mixed soil. The fill of the feature lacked any distinctive cultural specimens. All of the soil contained within the basin shaped pit was floated, dissolved in water to cause small ordinarily not readily observable material, i.e., seeds, small bone section, etc. to float. The excavation of Feature 99 resulted in interpreting the dark colored soil as the fill of a refuse pit. No reddening or firing of the surrounding soil was present nor any additional indicators which would have suggested the pit was originally utilized as a hearth. The depth of the excavated basin shaped pit was 28 cm. Flotation of the pit fill yielded no diagnostic floral or faunal specimens.

Feature 121 was discovered in X482 at a depth of 22 cm below the present surface. A roughly circular outline of dark soil and burned earth was exposed with small hand tools. The outline measured 60 cm along a north-south axis and 75 cm along an east-west axis. A cross section of the feature was achieved by excavating the northern one-half of the circular stain. Contained within the fill of this pit, were small flecks of charcoal and orange fired earth along with a few small flakes of chert and small fragments of bone. This pit was probably used last as a receptacle for refuse as indicated by the lack of diagnostic cultural materials, and the lack of floral remains which may have been used as foodstuffs. No evidence of in situ burning was observed within the immediate area of the pit. This shallow basin-shaped pit had a 15 cm depth after the excavation of the fill.

A dark circular discoloration was discovered in X611 at a depth of 21 cm below the present surface and recorded as Feature 40. Within the vicinity of this feature were pieces of unburned sandstone, although this rock debris was not directly associated with the designated feature. The dark humic discoloration was interpreted as being fill within a shallow depression of approximately 42 cm in diameter with a depth, after excavation, of 8 cm. No diagnostic cultural debris was affiliated with the dark fill of this feature except for a few small fragments of burned earth and charcoal. This particular feature was interpreted as being of recent origins and was not included on Figure 9.

Near the northern limit of Area 782, a single post mold was interpreted at a depth of 22 cm below the present surface in

X837. This feature first appeared as a circle of dark soil with a diameter of 19 cm. A vertical cross section was then made of the stain by removing the eastern one-half of the feature to determine the outline of the mold and possibly the post hole. The impression of the former post was easily discernible since the dark soil had atypical compaction and a darker, almost humic, composition which was not present in the surrounding undisturbed soil. Particles of charcoal and orange-fired burned earth were retained within the limits of the stain or fill, mostly in the lower half of the feature. The vertical cross section produced a profile of the mold in the form of a "V" or inverted cone. The mold itself was 44 cm in length from its upper limit to its tapering base. Feature 77 was the only discernible post mold at 14LT326 although several adjacent squares in the area were carefully excavated for additional post molds which may have represented a post pattern.

An additional cultural/natural feature was also discovered in Area 782 at the same depth which most of the prehistoric cultural materials were recovered. A large irregularly shaped orange stain was featured in X429. This excavation unit laid adjacent to the borrow ditch bordering the northern edge of the east-west trending county road and the southern limit of Area 782. The stain measured 120 cm along an east-west axis and 72 cm along a north-south axis. A cross section of the stain was made by excavating the eastern one half of the feature. No diagnostic cultural materials were recovered from the feature. The fill of this irregularly shaped feature consisted of charcoal flecks and burned earth. After the limit of the feature was defined, and the fill removed, it was determined that the feature was a result of a tree or stump burning at an undetermined point in time.

ARTIFACT MATERIALS

Ceramics

A total of 32 diagnostic ceramic fragments were recovered from Area 782 of 14LT326 of which nine were from below the agriculturally disturbed stratum. Of the total, 12 retain some evidence of cord-roughened exterior surfaces whereas the remainder show no indications of cord-roughening or are eroded to such a degree that no exterior surface treatments are discernible. Seventeen small weathered sherds are included in the recovered materials and range from 8 mm to 13 mm in diameter. These sherds are considered to be primarily clay-tempered although visual analyses, with the aid of seven to thirty power magnification indicated that numerous and varying substances or particles are included. The paste is generally fine and well compacted although numerous small fragments of hematite, manganese, shale

and possibly some pulverized pottery sherds or some other form of indurated clay particles are present. Most of these particles included in the sherds commonly occur in the various soils found within the Big Hill basin (Rowlison 1977: 95).

The colors of the ceramic sample vary through hues of buff to almost black. The exterior surface colors can primarily be placed in the range of browns and tans whereas the interior surfaces are predominantly a mixture of gray and brown. The cores of the sherds range in color from buff through gray to grayish brown with a blending of shades between the exterior and interior surfaces being quite common.

The cord-roughened surface on the sherds was probably the result of an application of a cord-wrapped paddle or using a cord-wrapped stick to thin the walls of the container prior to firing. Impressions retained on the sherds indicate that the cords were approximately 2 mm in width or that the cordage itself was about 2 mm in diameter. Casts of the cord marked surfaces of the fragments suggest the use of some form of fiber cordage which had similarities of a simple two ply S-twist (Rohn 1971: 114-115). Although most of the cord marks are 2 mm in width, all appear to be partially obscured by either intentional or unintentional smoothing. The cord-roughening of the vessel fragments has been applied in a parallel pattern and also cross cording in an oblique or perpendicular pattern.

The interior surface of the miscellaneous sherds range in color from buff to dark gray and are usually smoothed. Some specimens have what may be classified as an irregularly undulating or nodular interior surface. No scraping or brushing marks could be discerned on the interior surfaces of the sherds.

Only one small rim sherd was recovered during excavation. This specimen retains vertically applied cord-roughening on its exterior surface and a buff interior surface. In cross section, this sherd has a simple wedge shape and a maximum thickness of 8 mm which tapers towards the lip. The core is gray and primarily tempered with clay containing some random natural inclusions.

Since no restorable vessels or any large vessel fragments were recovered from Area 782 of 14LT326, no theoretical reconstruction of a ceramic container can be adequately made from the pottery sample. No evidence of bossing, incising, punctates or crack lacing holes were found in this ceramic inventory.

Chipped Stone

Projectile Points

Numerous bifacially flaked tools and tool fragments were recovered from the plow zone and the agriculturally undisturbed

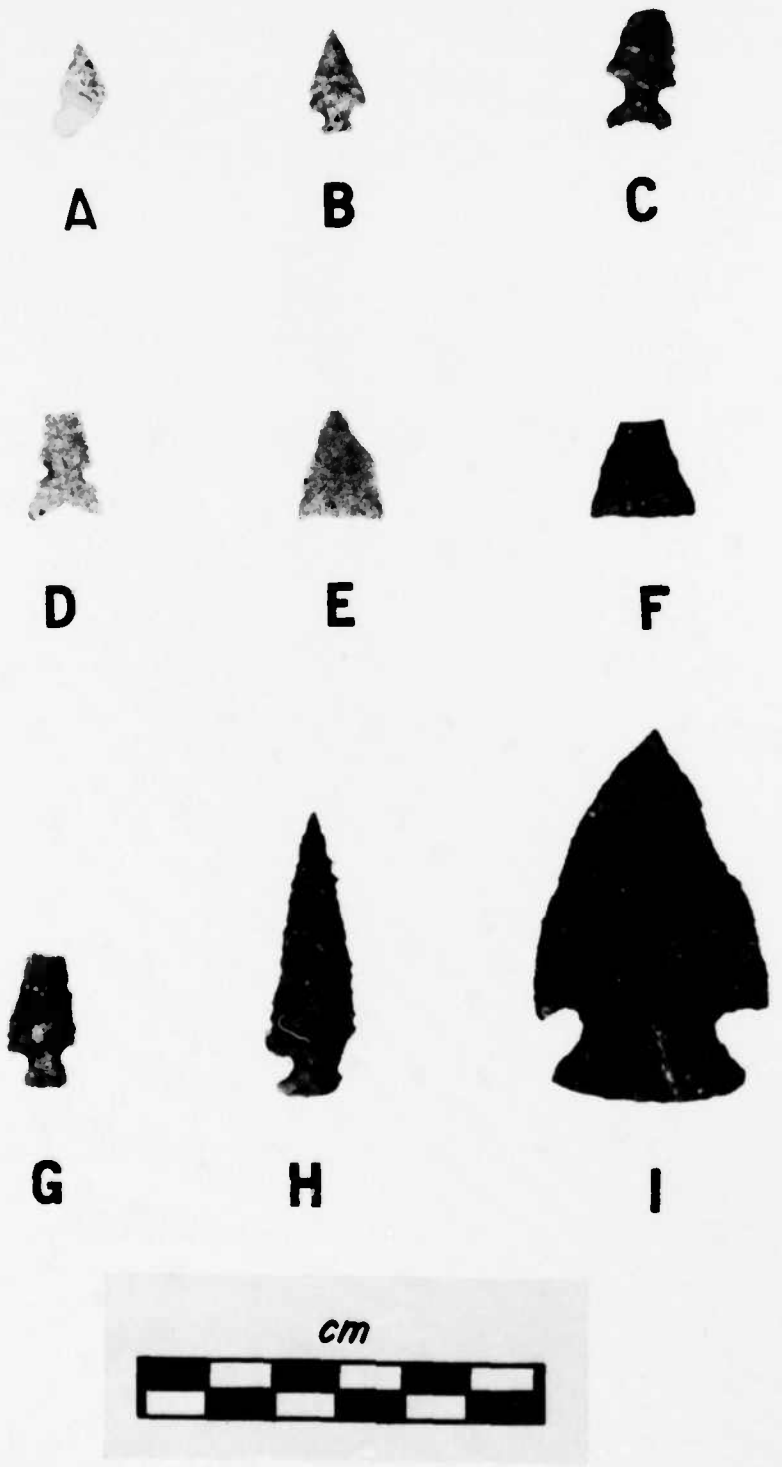


PLATE 11 Projectile points from 14LT326.
A, Keota point; B, G, and H, Scallorn points; C, Haskell point;
D, Harrel point; E - F, Fresno points; I, Snyders/Williams point.

habitation stratum. The projectile points and projectile point fragments were discovered randomly distributed throughout Area 782. At least six identifiable types are represented by the complete and mostly complete specimens recovered from various excavation units.

The scraping activity uncovered a plain triangular projectile point which had been manufactured from the locally occurring medium textured gray, fossiliferous chert. The edges and base of this bifacially flaked specimen are straight although the distal end, or point, is missing. This projectile point does retain characteristics which are associated with the Fresno type (Bell 1960: 44). The projected length of the specimen is 20 mm with a width of 16 mm and a thickness of 4 mm (Plate 11, F).

A small, triangular, side-notched projectile point was recovered from the base of the plow zone in the southern portion of Area 782. This specimen was made from a thermally altered tan chert. The sides of the bifacially flaked blade are straight and the base appears to be slightly convex. Approximately one-half of the base and stem are missing. The remaining portion of the specimen has the attributes of those projectile points which have been classified as Keota (Perino 1968: 42). The length of the artifact is 15 mm, the projected width is 9 mm, the thickness is 2 mm and the stem length is 5 mm (Plate 11, A).

From the upper 20 cm of Area 782, a bifacially flaked projectile point was recovered. This small artifact was manufactured from finely textured thermally altered chert. The blade is basically triangular and contains side notches whereas the base is concave or possibly broadly notched. This specimen may best be classified as a Harrell (Bell 1958: 30). The projected length of the specimen is 21 mm with a width of 12 mm, a thickness of 3 mm and a stem length of 6 mm (Plate 11, D).

At a depth of 24 cm below the present surface, in X598 a small triangular projectile point was featured. This bifacially flaked specimen was made from a fine textured light tan chert. The sides of this specimen are straight with corner notches. The stem is slightly expanding and the base is straight. The projectile point has been classified as a Scallorn (Bell 1960: 84). The length of this particular artifact is 17 mm, the width is 9 mm, the thickness is 3 mm and also the stem length is 3 mm (Plate 11, B).

Feature 93 consisted of a bifacially flaked projectile point which was manufactured from the locally occurring gray chert. This specimen is side notched and has a triangular

blade with straight sides. The tip or distal end of the blade is absent. A concave base supports an expanding stem. This artifact has attributes which are characteristic of the Haskell forms (Perino 1968: 32). The projected length of the specimen is 24 mm, the width is 11 mm, thickness is 4 mm and the stem length is 8 mm (Plate 11, C).

A medium to large sized projectile point was discovered in X452 at a depth of 28 cm below the present surface. This specimen was manufactured from the locally occurring field chert. This bifacially flaked artifact exhibits a large, triangular, corner notched blade with convex edges and a lenticular cross section. The stem expands into a convex base which has been basally ground. This particular projectile point has traits which are shared by both the Snyders (Bell 1958: 88) and Williams (Bell 1960: 96) types although none of the attributes or ratios of these specimens significantly outweigh the other for a type categorization. The length of the artifact is 57 mm, the width is 35 mm, the thickness is 9 mm and the stem length is 12 mm (Plate 11, I).

Bifaces

Miscellaneous bifacially flaked tool fragments were recovered from the plow zone and the agriculturally undisturbed cultural stratum of Area 782. Some of these specimens, which were manufactured from a variety of cherts, could only be recognized as proximal sections of projectile points or knives whereas others were apparently blade tips or blade midsections, a few of which had been thermally altered.

From the surface of Area 782, a bifacially flaked tool or tool section was recovered. This specimen was made from a medium textured white chert. The lateral margins and also the distal end of this tool retain evidence of percussion flaking. In comparison with the lateral edges, the unbroken distal portion is more smoothly worn. The unbroken end of this specimen is unifacially tapered to an approximate 45 degree bevel near the end margin. This tool may have been utilized as a blade for a gouge, adz or flesher. The length of this artifact, although possibly incomplete, is 38 mm, the width is 31 mm and the thickness is 9 mm.

An artifact recorded as Feature 123 was recovered from just below the agriculturally disturbed zone in X458. This tool fragment has been bifacially flaked from the locally abundant gray field chert. Evidence of wear is apparent along the slightly tapering lateral edges and both faces of the artifact exhibit patina. In cross section, the specimen is broadly elliptical. This tool section has been classified as a drill section. The length of the fragment is 42 mm, the width is 11 mm to 13 mm and the thickness is 6 mm to 8 mm.

Unifaces

A small unifacially flaked tool was recovered from a depth of 28 cm below the present surface in X458. This specimen has been manufactured from finely textured, thermally altered, pinkish-gray chert. A short, sharply pointed protuberance on this artifact exhibits indications of having been intentionally modified by unifacial pressure flaking. Longitudinally, this specimen is concave-convex in section with marginal unifacial flaking apparent along the distal end of the concave face. This artifact was probably used as a piercing tool such as an awl. The overall length of the artifact is 17 mm with the tapering protuberance being 4 mm of that length. The width of the specimen is 14 mm and the thickness is 4 mm.

An irregularly shaped small artifact, made from thermally altered tan chert was recovered from the plow zone in the southern portion of Area 782. This specimen contains a unifacially flaked crescent shaped notch which was probably used as a small drawknife or spokeshave. The notch is 9 mm wide at its opening and 3 mm in depth.

A similar tool manufactured from a secondary flake of finely textured gray chert was also found in the agriculturally disturbed zone. The crescent notch of this specimen is 16 mm wide at the mouth and 4 mm deep.

A relatively large unifacially flaked blade was recovered from the plow zone. This tertiary specimen is of a finely textured, thermally altered, pinkish-gray, fossiliferous chert. A fine quality of unifacial parallel pressure flaking is exhibited along one lateral margin of the artifact. The opposite edge has no indications of pressure flaking although scars from percussion flaking are evident. The overall characteristics of this tool suggest that it was probably designed as a cutting implement rather than a scraping tool. The length of the blade is 54 mm, the width is 32 mm and the thickness ranges from 4 mm to 6 mm.

A heated tertiary flake of finely textured gray chert was discovered within the upper 20 cm of Area 782. Unifacial flaking is exhibited along one lateral edge of the artifact. No other indication of modifications can be discerned on this specimen. Morphologically, this blade appears to have more of the characteristics of a cutting blade rather than a scraping tool. The length of the implement is 46 mm, the width is 22 mm and the thickness is 5 mm.

From the agriculturally disturbed zone of X609 a unifacially worked secondary flake of finely textured tan chert was recovered.

This specimen exhibits modifications created by steep pressure flaking along one edge. This artifact has been classified as a side scraper with a length of 43 mm, a width of 31 mm and a thickness of 8 mm.

Other large unifacially flaked specimens were retrieved from the upper 20 cm of Area 782 and have been classified as endscraper and sidescraper fragments. These tool fragments have been made from a variety of cherts, some of which show indications of being thermally altered. Although small, these implement fragments do retain morphological characteristics which can be associated with similar or more complete tools hence, only a general and nondescriptive classification can be made of these specimens.

Core Remnant

An irregularly shaped core remnant was discovered within the plow zone of X703. This specimen is of finely textured white chert and retains no distinctively chipped faces although numerous flaking scars are evident, indicating that this specimen had been almost totally utilized as a tool source. This exhausted core is 42 mm in length, 24 mm in width and 12 mm in thickness.

Modified Flakes

Ten discernible and intentionally modified flakes were recovered from Area 782. All but one of these specimens were found within the upper 20 cm of the site. The exception was found in the fill of Feature 87, a concentration of burned earth. Eight of the modified flakes exhibit unifacial pressure flaking along one edge and one retains evidence of unifacial modifications along two lateral margins. A bifacially modified flake retains evidence of wear which is indicated by a slight, but noticeable patina. Six of the ten specimens appear to have been thermally altered. The average length of these particular flakes is 24.5 mm, whereas the average width is 19.5 mm and the thickness is 4.5 mm.

Debitage

Typically, most lithic specimens recovered from Area 782 consist of chert debitage from the upper 20 cm of the vicinity. The same classification system utilized for the Area 781 debitage was also used for the specimens from Area 782. A total of 486 miscellaneous chips and flakes were recovered from the 67 excavation units and also the stripped areas in Area 782. None of these specimens had been modified by intentional flaking although 220 retained indications of having been thermally altered either intentionally or unintentionally.

From a total of 486 chips and flakes from Area 782, approximately 43% of the specimens or 208 pieces appear to be of a Florence chert variety, which is common west of the Big Hill basin, within the Flint Hills region. Of these pieces, which are recognized as Florence chert, 94 or 45% retain some evidence of being thermally altered. All but six of the specimens are tertiary flakes; two are primary pieces, and four are secondary.

Other miscellaneous debitage consists of a variety of cherts. The local field chert is represented by 76 chips and flakes of which 25 are primary specimens, 13 are secondary and 39 are tertiary; one of the secondary specimens has been thermally altered. Finely textured white chert was inventoried as consisting of two primary specimens, of which one has been heated; one secondary flake; and 45 tertiary chips and flakes, of which two have been thermally altered. Tan chert specimens consist of 47 pieces of which three are secondary and 44 are tertiary, including 11 which exhibit some degree of heat alteration.

Chips and flakes of a pinkish hue were recovered from various excavation units and represent approximately 23% of the total debitage inventory. Some of these specimens exhibited a slight gray or tan hue although the original color of the raw chert was not discerned in the analysis. All but two of the pieces were classified as tertiary specimens. No primary pieces were represented. All of these specimens were either intentionally or unintentionally thermally altered to some degree but could not be classified into any distinct chert criterion.

One small translucent gray chip of obsidian was also recovered from Area 782. Obsidian is usually lacking in the lithic inventories of southeastern Kansas. The geographic area from which this specimen originated has not been determined.

Ground Stone

Eight diagnostic sandstone artifacts retaining indications of having been modified by grinding, smoothing, or pecking were recovered from Area 782.

From the surface of the area, two fragmented grinding stones or manos were collected. One specimen has been manufactured from unburned locally occurring sandstone. This piece is an end fragment which is rounded and retains a portion of a smoothed plane face, the opposite face apparently has been broken. The width of the fragment is 90 mm. The other mano fragment consists of a very dense unburned sandstone which is atypical of the outcrops in the Big Hill lake basin. This artifact consists of an end fragment which is square with rounded corners. Both faces are slightly convex and exhibit minimal indications of intentional extensive wear

or smoothing, as if the specimen was not heavily utilized or was broken and discarded soon after its manufacture or ephemeral usage. The width of this fragment is 87 mm and the thickness is 45 mm.

Three unifacially smoothed sandstone fragments were recovered from the habitation level of Area 782. All of these specimens retain indications of having been heated or burned directly. The three specimens have been classified as grinding slab fragments of the locally occurring sandstone. The thickness of the smoothed artifacts range from 29 mm to 37 mm with the largest section being 163 mm in length and 130 mm in width.

Three cupped stones were featured in the thin habitation stratum of 14LT326. These implements have been classified as nutting stones. The three artifacts are amorphous in form, but retain the characteristics usually attributed to an anvil used for cracking nuts such as black walnuts.

One nutting stone was discovered at 30 cm below the present ground surface within X581. This artifact consists of a fist sized chunk of unburned weathered sandstone of a variety which occurs on a hill just east of the site. A hemispherical depression has been pecked or chipped into one smoothed face of the specimen. The chipped depression or cup is 27 mm in diameter with a depth of 8 mm. The overall length of the artifact is 105 mm, with a width of 70 mm and a thickness of 51 mm.

A triangular chunk of the locally occurring sandstone was recovered from the 27 cm depth of X600. A hemispherical depression has been pecked into a smoothed face of what may have been a portion of a grinding slab. Additional but irregular depressions were observed on other faces of the artifact, but these may be the result of natural weathering. The depression in this nutting stone is 29 mm in diameter with a depth of 7 mm. The maximum length of the specimen is 100 mm, the width is 80 mm and the thickness is 57 mm.

At a depth of 27 cm below the surface in X629, a bifacially cupped nutting stone was exposed. This fist sized implement contains hemispherical depressions on opposite smoothed faces. This artifact retains characteristics which are usually associated with a hand grinding stone, muller or mano inasmuch as the size, the thickness, two smoothed faces and also the mostly complete rounded end is similar to other grinding implements found in the vicinity. Possibly this tool was utilized as a grinding stone prior to being broken or discarded then the tool was reutilized as an anvil or cupped nutting stone after the

depressions were pecked into the sandstone. The diameter of the two depressions are 25 mm and 29 mm, the depths are 5 mm and 6 mm. The length of the specimen is 86 mm, the width is 72 mm and the thickness is 38 mm.

FAUNAL REMAINS

Several burned and unburned bone sections were recovered from the excavation units in Area 782 of 14LT326. Generally, the bone material is poorly preserved and can only be classified into relative categories such as the remains of large, medium or small mammals. The bones which could be accurately identified include deer (Odocoileus), turtle (Testudinae), hison (Bison), beaver (Castor canadensis) and small bone fragments of unidentified birds (Johnson 1978).

SUMMARY AND CONCLUSIONS

The cultural materials recovered during the 1978 investigations at 14LT326 have been interpreted as representing a single prehistoric component. All cultural data recovered and collected at this site presently suggest a short term occupation during the late Early Ceramic period by Plains Woodland people. A comparison of the general artifact assemblage from this site with others in the Big Hill vicinity and related sites in southeastern Kansas, provides an insight and additional unanswered questions concerning the prehistoric lifeways and occupation of the region.

Analyses of the artifacts from previous excavations conducted within the Big Hill basin indicate that the ceramic inventory of four Cuesta phase houses contains a significant amount of cord-roughened body sherds. Although the ceramic sample from 14LT306 is relatively small, 43% of the sherds retained evidence of cord-roughened exterior surfaces whereas a Cuesta house of 14LT316 yielded a sherd inventory of which only 11% of the fragments exhibited some degree of cord-roughening. In all of the houses excavated during the 1973 season, cord-roughened sherds were recovered from the same occupational strata which yielded plain and decorated Cuesta wares, intermixed with a Plains Woodland lithic assemblage.

The cord-roughened sherds from the Big Hill vicinity share some attrihutes with both Pomona and Greenwood materials (Witty 1978), which are found throughout the eastern one-third of Kansas. Similarities among the pottery specimens from 14LT326 and those belonging to the Pomona and Greenwood peoples only suggest that the same methods of manufacturing were utilized for at least a millenium within the eastern central plains region. Archeological evidence suggests that the cord-roughened ceramics do not indicate the continuous existence of any particular group or culture in eastern Kansas.

No discernible prehistoric structural remains were discovered at 14LT326 although indications of a brief but intensive occupation with evidence of associated cultural activities remains. The presence of milling and anvil stones, shallow basin shaped pits, lithic rejectage, chipped stone tools, a burned stone complex plus some fragmentary animal bone may be interpreted as a specific food preparation area or possibly a seasonal habitation site for a small group. A midden area, which would indicate an occupation for an extended duration, was not present at this site.

Although a thin shallow habitation stratum was discovered in Area 782 at 14LT326 the possibility of severe erosion at the site, caused by flooding over the past 1,000 years must be considered. Within the past two years, this site has been totally inundated by the seasonal flooding of Big Hill creek. In times past, the cultural stratum may have been exposed to the elements numerous times, subjecting the cultural material to natural but adverse effects. In comparison, other known sites within the limits of Big Hill lake have been displaced or obliterated by flooding since the initial archeological survey of 1966.

Samples for radiocarbon dating were not obtained from the habitation zone of 14LT326 due to the limited amount of scattered charcoal and the contaminative intrusions created by the perennial grass roots. Comparative data, resulting from the present regional archeological information, suggests that the primary occupation at 14LT326 probably occurred during the latter part of the Early Ceramic period.

SUMMARY

The recent archeological investigations at Big Hill lake have provided additional data concerning prehistoric habitation along a portion of Big Hill creek. Analyses of the archeological data have resulted in reconsidering some previous theoretical cultural reconstructions for the southeastern portion of Kansas. Cultural remains and radiocarbon dates suggest that the basin of Big Hill lake have been occupied by man for approximately 5,000 years.

Cultural remnants of the Archaic period, found within the project area, indicate the presence of a small hunting and/or gathering group. The Archaic component of 14LT319 yielded a total of two hearths and a relatively small quantity of debitage and local sandstone grinding slab fragments. No diagnostic chipped stone tools were recovered from this component. The lack of tools or tool fragments within this activity area supports the hypothesis of a temporary campsite. Debitage in the Archaic stratum primarily consisted of the locally abundant field chert although nonlocal varieties were also recovered. The presence of the "exotic" chert is suggestive of direct or indirect contact with other peoples or territories. Although the bone material was generally fragmentary, two elements of antelope were recovered from the hearth, indicating the possibility that a meal was prepared and possibly consumed at this site.

The cultural sequence of the region remains somewhat indistinct between the Preceramic/Archaic period and the later Early Ceamic/Cuesta phase period. From a depth of 1 m below the present surface at 14LT319, three chipped stone tools were recovered which retain attributes similar to point types from both Preceramic and Early Ceramic cultural affiliations. One small extremely eroded pottery fragment was recovered from the approximate 1 m depth in 1976. On that basis, and the fact that the surface component at 14LT319 contained Early Ceramic material, it is speculated that the 1 m deep stratum represented a transition period between the Archaic period and the Cuesta phase. The lack of cultural data from this level prevents an accurate hypothetical reconstruction of the nonspecific activities which may have occurred at this site.

Three sites which were excavated during the 1978 season have been interpreted as Early Ceramic sites. 14LT304 was a multiple house site which contained two Cuesta phase houses and other cultural features which were probably not directly associated with the house structures. All of 14LT304 was either systematically excavated or monitored throughout the three seasons of archeological investigations. Results of those

studies suggest an extended settlement pattern once existed along the upper reaches of Big Hill creek as multiple or solitary house sites, In comparison, the Cuesta phase site at 14MY305 was a more compact or nucleated village which housed a larger population and had an established midden mound. Other sites excavated in the Big Hill vicinity, which contained Cuesta materials appear to be campsites utilized as areas for food processing, workshops, etc. 14LT326 contained a burned limestone complex, a general lithic and ceramic inventory, several nutting stones, and no indications of structural remnants. 14LT305 has been classified as a nonspecific campsite. No structural remnants nor indications of intensive habitation were discovered. The artifact inventory of the site reflects a Cuesta phase cultural affiliation.

No sites which were inhabited later than the Early Ceramic period were investigated during the 1978 field season.

Erosion from flooding and cultivation have eliminated the need for future archeological investigations at many prehistoric sites. The partial excavation of three top priority sites in 1973 demonstrated the existence of significant cultural data within the Big Hill lake basin. Testing activities in 1976 provided additional information that in situ cultural material remains at several previously recorded prehistoric sites. The 1978 study extensively investigated four of those sites which were recommended for additional work as a result of the 1976 project. The most recent findings indicate that a vast amount of cultural data do not exist in the sites which have been designated as campsites within the Big Hill lake basin.

REFERENCES CITED

Abel, A.H.

1904 Indian reservations in Kansas and the extinguishment of their title. *Transactions of the Kansas State Historical Society* 8;1903-1904:72-109, Topeka.

Andreas, A.T.

1883 *History of the State of Kansas* 2, Chicago.

Baerreis, D.A.

1939 A Hopewell Site in Northeastern Oklahoma. *Society for American Archaeology Notebook.* December 15, 77-78.

1951 The Preceramic Horizons of Northeastern Oklahoma *Anthropological Papers No. 6*, Museum of Anthropology, University of Michigan, Ann Arbor.

1953 Woodland Pottery of Northeastern Oklahoma, *In: Prehistoric Pottery of the Eastern United States*, J.B. Griffin, editor. Museum of Anthropology, University of Michigan, Ann Arbor.

Baldwin, J.

1969 The Lawrence site, NW-6, a non-ceramic site in Nowata county, Oklahoma. *Miscellaneous Report No. 4.* Oklahoma River Basin Survey, University of Oklahoma Research Institute, Norman.

1970 The Lightning creek site, NW-8, Nowata county, Oklahoma. *Archeological Site Report No. 18*, Oklahoma River Basin Survey, University of Oklahoma Research Institute, Norman.

Barry, L.

1972 *The Beginning of the West: Annals of the Kansas Gateway to the American West, 1540-1854.* Kansas State Historical Society, Topeka.

Bell, R.E.

1958 Guide to the identification of certain American Indian projectile points. *Special Bulletin No. 1*, Oklahoma Anthropological Society.

Bell, R.E.

1960 Guide to the identification of certain American Indian projectile points. *Special Bulletin No. 2*, Oklahoma Anthropological Society.

Bradley, L.

1971 *Subsistence Strategy of a Late Archaic Site in South Central Kansas*. Master's Thesis. Department of Anthropology, University of Kansas, Lawrence.

Brewster, S.W.

1906 Reverend Father Paul M. Ponziglione. *Collections of the Kansas State Historical Society* 9;1905-1906:19-32, Topeka.

Bryan, J.E.

1879 Some accounts of the ante-bellum settlers of Labette county, Kansas. *The Independent*, March 1, 1879.

Buckley, J.

1977 Personal communication. Teledyne Isotopes, Radiocarbon Laboratory.

Calabrese, F.A.

1967 The Archeology of the Upper Verdigris Watershed. *Kansas State Historical Society Anthropological Series 3*. Topeka.

Carman, J.N.

1954 The Bishop East of the Rockies Views His Diocesans, 1851-1853. *Kansas Historical Quarterly* 21(2):81-86, Topeka.

Carrell, Rayl and Lenihan

1976 *The Effects of Freshwater Inundation of Archeological Sites Through Reservoir Construction*. U.S. Department of Interior, Washington.

Case, N.

1893 *History of Labette County, Kansas, From the First Settlement to the Close of 1892*. Crane and Company, Topeka.

Case, N.

1901 *History of Labette County, Kansas and Representative Citizens.* Biographical Publishing Company, Chicago.

Catlin, G.

1973 *Letters and notes on the manners, customs, and conditions of the North American Indians.* Dover Publications, Inc. (first published in London, 1844) 1, New York.

Champe, J.L.

1946 Ash Hollow cave. University of Nebraska Studies Series No. 1, Lincoln.

1948 A is for Apple. *Plains Archeology Conference Newsletter,* 1(3).

Corps of Engineers

1973 Final environmental statement, Big Hill lake, Big Hill creek, Kansas. U.S. Army Corps of Engineers, Tulsa District, Tulsa, Oklahoma.

Crabtree, D.E.

1972 An Introduction to Flintworking. *Occasional Papers of the Museum, No. 28.* Idaho State University, Pocatello.

Dickerman, A.T.

1909 A Hot Day in 1869. *Oswego Democrat,* November 6, 1909 in Labette county clippings 2:12.

Dickey, H.

1977 Personal communication. Kansas Geological Survey.

Ellsworth, H.L.

1937 *Ellsworth's Narrative of Washington Irving on the Prairie.* Edited by Williams and Simpson. American Book Company, New York.

Fitzgerald, Sister M.P.

1939 *Beacon on the Plains.* St. Mary College, Leavenworth.

Fleming, J.

1977 Personal communication. Labette county Soil Conservation Service.

Flora, S.D.

1948 Climate of Kansas. *Report of the Kansas State Board of Agriculture* 67(285), Topeka.

French, F.B. (compiler)

1851 *Historical Collections of Louisiana, Part III.* D. Appleton and Company, New York.

Grosser, R.D.

1970 *Report on the Snyder Site: An Archaic-Woodland Occupation in South Central Kansas.* Master's Thesis. Department of Anthropology, University of Kansas, Lawrence.

1973 A Tentative Cultural Sequence of the Snyder Site, Kansas. *Plains Anthropologist* 18(61):228-237.

Gill, H.G.

1903 The establishment of counties in Kansas. *Collections of the Kansas State Historical Society* 8;1903-1904, Topeka.

Henry, D.O.

1977 *The Prehistory and Paleoenvironment of Birch Creek Valley.* Laboratory of Archaeology, University of Tulsa, Tulsa.

Howard, J.H.

1964 Archeological Investigations in the Toronto Reservoir Area, Kansas. *Bureau of American Ethnology, Bulletin 189, River Basin Survey Papers, No. 38*, 319-370, Washington, D.C.

Irving, W.

1849 The Crayon Miscellany. G.P. Putnam's Sons, Philadelphia.

Latrobe, C.J.

1835 *The Rambler in North America, 1832-1833*, Seeley and Burnside, 1, London.

McCoy, J.C.

1890 Survey of Kansas Indian Lands. *Transactions of the Kansas State Historical Society, Fifth and Sixth Biennial Reports, 1886-1890*, 4:300-311, Topeka.

McClain, T.

1977 Personal communication. Kansas State Geological Survey.

McDermott. J.F., editor

1940 *Tixier's Travels on the Osage Prairies* (translated from the French by Albert J. Salvan). University of Oklahoma Press, Norman.

1944 *The Western Journals of Washington Irving*. University of Oklahoma Press, Norman.

Mallouf, R.J.

1976 Archeological Investigations at Proposed Big Pine Lake, 1974-1975, Lamar and Red River Counties, Texas. *Archeological Survey Report No. 18*, Texas Historical Commission, Austin.

Marshall, J.O.

1966a Appraisal of the Archeological Resources of the Big Hill Reservoir, Labette County, Kansas. Manuscript on file at the Kansas State Historical Society, Topeka.

1966b Archeological Survey of the Big Hill Reservoir Area, Labette County, Kansas, *Kansas Anthropological Association Newsletter* 12(4).

1972 The Archeology of the Elk City Reservoir, *Kansas State Historical Society, Anthropological Series 6*, Topeka.

Mathews, J.J.

1961 *The Osages, Children of the Middle Waters*, University of Oklahoma Press, Norman.

Moorhead, W.K.

1931 *Archeology of the Arkansas River Valley*. Yale University Press, New Haven.

Newton, W.S.

1879 Early Medical History of Labette County. *The Independent*, November 15, 1879, Oswego, Kansas.

1893 Ancient People - on the lower Neosho river. *American Crank*, January 14, 1893, Oswego, Kansas.

O'Connell, W.A.

1951 A Little Story of Labette County. *Oswego Democrat*, October 19, 1951, Oswego, Kansas.

1960 More About the Early History of Oswego and Labette County. *Oswego Democrat*, March 23, 1960, Oswego, Kansas.

1977 Random Samplings From the Timetable of Labette County. *The Edna Sun* 82(25), March 31, 1977, Edna, Kansas.

Perino, G.

1968 Guide to the identification of certain American Indian projectile points. *Special Bulletin No. 3*, Oklahoma Anthropological Society.

Prewitt, T.J.

1968 Archaeological Survey of the Oologah reservoir, Nowata and Rogers Counties, Oklahoma. *General Survey Report No. 10.* Oklahoma River Basin Survey Project, University of Oklahoma Research Institute, Norman.

Remsburg, G.J.

1912a Random archeological notes. *The Archeology Bulletin* 3(1):23-24.

1912b Abstracts of correspondence relative to Kansas archeology. *The Archeology Bulletin* 3(4):121-122.

Ritchie, W.A.

1969 *The Archaeology of New York State.* The Natural History Press, Garde City, N.Y.

Rohn, A.H.

1971 Mug House. *Archeological Research Series Number Seven-D*, National Park Service, U.S. Department of the Interior, Washington.

Ross, E.C.

1928 The Bloody Benders. *Collections of the Kansas State Historical Society 1926-1928* 17:464-479, Topeka.

Rott, D.E., D.W. Swanson, and G.E. Jorgensen, Jr.

1973 *Soil Survey of Crawford County, Kansas.* United States Department of Agriculture, Soil Conservation Service, and Kansas Agricultural Experiment Station.

Rowlison, D.D.

1977a A Preliminary Report of the 1976 Big Hill Reservoir Project. *Kansas Anthropological Association Newsletter,* 22(6).

1977b A Report of Archeological Investigations at the Big Hill Lake Project, Southeastern Kansas. Manuscript on file in the Archeology Department of the Kansas State Historical Society, Topeka.

1978 1978 Investigations at Big Hill Lake. *Kansas Anthropological Association Newsletter,* 24(2-3).

Schoewe, W.H.

1949 The Geography of Kansas, Part II, Physical Geography. *Transactions of the Kansas Academy of Science,* 52(3):261-333, Lawrence.

Schrader, F.C.

1906 *Economic Geology of the Independence Quadrangle, Kansas.* Department of the Interior, United States Geological Survey, Bulletin 296.

1908 Description of the Independence quadrangle. *Geologic Atlas of the United States, Independence Folio, Kansas.* Department of the Interior, United States Geological Survey.

Swanson, D.W., and R.L. Googins

1972 *Soil Survey of Woodson County, Kansas.* United States Department of Agriculture, Soil Conservation Service and Kansas Agricultural Experiment Station.

Tomb, A.S.

1979 Personal communication.

Varner

1951 *A Rapid Reconnaissance of South Eastern Kansas to Locate Indian Sites.* Manuscript on file in the Archeology Department of the Kansas State Historical Society, Topeka.

Weakly, W.F.

1965 1964 Archeological Salvage in the Elk City Reservoir. *Kansas Anthropological Association Newsletter*, 10(6).

Wedel, W.R.

1943 Archeological Investigations in Platte and Clay Counties, Missouri. *Smithsonian Institution Bulletin 183*, United States National Museum, Washington, D.C.

1959 An Introduction to Kansas Archeology. *Bureau of American Ethnology Bulletin 174*, Smithsonian Institution, Washington, D.C.

1961 *Prehistoric Man on the Great Plains.* University of Oklahoma, Norman.

Wilmeth, R.

1959 Appraisal of the Archeological Resources of the Pomona and Melvern Reservoirs, Osage County, Kansas. Manuscript on File in the Archeology Department of the Kansas State Historical Society, Topeka.

1970 Excavations in the Pomona Reservoir. *Kansas State Historical Society Anthropological Series 5*, Topeka.

Witty, T.A., Jr.

1961a Appraisal of the Archeological Resources of the John Redmond Reservoir, Coffey and Lyon Counties, Kansas. Manuscript on file in the Archeology Department of the Kansas State Historical Society, Topeka.

1961b Appraisal of the Archeological Resources of the Council Grove Reservoir, Morris County, Kansas. Manuscript on File in the Archeology Department of the Kansas State Historical Society, Topeka.

1962 Appraisal of the Archeological Resources of the Elk City Reservoir, Montgomery County, Kansas. Manuscript on file in the Archeology Department of the Kansas State Historical Society, Topeka.

1963a 1963 Excavations in the John Redmond Reservoir. *Kansas Anthropological Association Newsletter*, 9(2).

1963b The Woods, Avery and Streeter Archeological Sites, Milford Reservoir, Kansas. *Kansas State Historical Society Anthropological Series 2*, Topeka.

Witty, T.A., Jr.

1964 Radiocarbon dates from the John Redmond reservoir area. *Kansas Anthropological Association Newsletter*, 9(9).

1965 Ten additional radiocarbon dates from archeological sites in Kansas. *Kansas Anthropological Association Newsletter*, 10(7-9).

1967 The Pomona Focus. *Kansas Anthropological Association Newsletter*, 12(9).

1973 Personal communication.

1976 The problem of archeological conservation within major geographic land and water resource areas of Kansas. Manuscript on file in the Archeology Department of the Kansas State Historical Society, Topeka.

1977 Personal communication.

1978 Personal communication.

1979 Personal communication.

Wood, C.E.

1977 Personal communication.

Wood, W.R.

1960 Afton points in the Ozark highlands: context and comments. *Bulletin of the Oklahoma Anthropological Society*, 8:41-49, Oklahoma City.

1961 The Pomme de Terre Reservoir in Western Missouri Prehistory. *The Missouri Archaeologist*, 23:1-131, Columbia.

Wyckoff, D.G.

1963 The Kerr Dam Site, MY-48, A Stratified Site in the Markham Ferry Reservoir Area. *Occasional Publications of the Oklahoma River Basin Survey Project*, Norman.

1964a The Jug Hill Site, MY-18, Mayes County, Oklahoma. *In: Three Archeological Sites in the Markham Ferry Reservoir Area, Mayes County, Oklahoma.* Reprinted from Bulletin of the Oklahoma Anthropological Society, 12;March:1-53, Oklahoma City.

1964b The cultural sequence of the Packard Site, Mayes County, Oklahoma. *Archeological Site Report No. 2*, Oklahoma River Basin Survey Project, University of Oklahoma Research Institute, Norman.

APPENDIX

BIG HILL ARCHEOLOGICAL DISTRICT

The Kansas State Historic Preservation Officer nominated the area encompassing Big Hill lake as an archeological district for the National Register of Historic Places January 23, 1976. The nomination was due to the demonstrated potential of the area's nonrenewable cultural resources for archeological data relevant to Kansas history. The Big Hill Archeological District was entered in the National Register on November 23, 1977. Presently, the district includes all of the Big Hill lake basin from the dam along its southern periphery to its northern limit, which is one mile (1.6 km) north of the U.S. Highway 160. The eastern and western boundaries of the district have been established along lines well away from the known archeological sites within the project area.

Since many of the archeological sites would be adversely effected by lake related construction activities, a determination of mitigative action was developed. The appropriate scheme considered that the true historic and scientific potential of these sites would best be realized by study, rather than perpetual preservation. Therefore, intensive investigation by excavation techniques was the recommended mitigation. The 1978 archeological investigations within the Big Hill District was in accordance with Section 800.4(d) and complies with the Advisory Council's "Procedures for the Protection of Historic and Cultural Properties" (36 CFR, Part 800) (Letters on file in the Kansas State Historic Preservation Officer's office).

POLLEN ANALYSES

The pollen analyses were made by Dr. A. S. Tomb of the Division of Biology at Kansas State University, Manhattan. All of the pollen samples were taken from a 2 m deep northern profile at 14LT319. This site was chosen because of the depth of buried cultural component which yielded a radiocarbon date of 5,500 $\pm$ 215 years B.P., or approximately 3,600 B.C. (Buckley 1977). The samples were taken in 10 cm intervals from just below the present surface of the site to the earliest known component of 14LT319.

The following report was written by Dr. Tomb which explains his laboratory procedure plus his results and conclusions:

Procedure for Extraction of Pollen from Soil

1. Pulverize soil with mortar and pestle.

2. In a beaker, place ca 5 grams of sample with ca 50 ml of HCl to remove carbonates.

3. Let stand for 3 hrs. Add more HCl, if it bubbles, then add more HCl and let stand. (This step is repeated until carbonates are removed.)

4. Wash samples with water; let stand.

5. Decant supernatant.

6. Add HF to remove silicates. Let stand overnight. Place material in centrifuge tubes.

7. Wash with water.

8. Add Darvon (industrial detergent) solution; sonicate for 30 min.

9. Wash with water.

10. Add flotation mixture (zinc bromide at 1.92 specific gravity) to the samples; agitate and pour the mixture into doubled lengths of flexible clear plastic tubing placed inside centrifuge tubes.

11. Centrifuge for 3 minutes at 2,000 RPM.

12. Pinch the soft tubes just below the floating residue and pour into a centrifuge tube and add a large volume of water.

13. Centrifuge at 2,000 RPM for 5 minutes and check to see if material has formed a pellet at the base of the tube. If pellet has not formed, add more water and centrifuge.

14. Prepare microscopic slides using glycerine jelly.

Six soil samples from the 14LT319, A781, N profile site have been processed for palynological specimens. All of these yielded pollen but in very low quantities and with poor preservation. Only one of the 6 samples had enough pollen to score percent occurrences. This was sample #4 from 70-80 cm below the surface. This sample had less than 50 pollen grains (usually 100 is the lowest reliable number and 400 grains is more typical).

Grass pollen	40%
Low spine (Ambrosia-like) compositae	25%
Oak	6%
Sedge	6%
Artemisia	6%
Malvaceae (?)	8%
Elm	4%
Ash	2%

Fungal spores also present

The other samples had grass and ragweed pollen as the most common types, but were not well preserved. In all of these, the ragweed type was most frequent and I think that is an artifact of pollen preservation because compositae pollen is very resistant.

It would be highly speculative to draw conclusions about the vegetation at the deposition site based on only a single sample even if it had an adequate amount of pollen. Yet the pollen found in the 6 samples are consistent with the pollen rain in a grassland/oak savannah. I would doubt that the vegetation was much different from that of the present.

AST Lab No.	14LT319, A781 Samples Examined	Number of Grains Found	Most Common Type
1	40-50 cm BS	21	ragweed
2	50-60 cm BS	17	ragweed
3	60-70	28	ragweed
4	70-80	47	grass
5	80-90	24	ragweed
6	90-100	14	grass equal to ragweed

A. Spencer Tomb
Associate Professor
Division of Biology, K.S.U.

END

DATE
FILMED
10-81

DTIC